Atlantic States Marine Fisheries Commission

ISFMP Policy Board

August 8, 2024
8:30 – 10:00 am

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order *(J. Cimino)*	8:30 a.m.
2.	Board Consent *(J. Cimino)* • Approval of Agenda • Approval of Proceedings from May 2024	8:30 a.m.
3.	Public Comment	8:35 a.m.
4.	Executive Committee Report (*J. Cimino*)	8:45 a.m.
5.	Update on American Eel Convention on International Trade of Endangered Species Activity	8:55a.m.
6.	Discuss H.R. 8705, the *Fisheries Data Modernization and Accuracy Act of 2024* (*R. Beal*) **Possible Action**	9:10 a.m.
7.	Presentation of National Fish and Wildlife Foundation Electronic Monitoring and Reporting (*W. Goldsmith*)	9:25 a.m.
8.	Committee Reports • Habitat Committee (*S. Kaalstad*) **Action** • Atlantic Coast Fisheries Habitat Partnership (*S. Kaalstad*) • Assessment Science Committee (*J. Patel*) **Action**	9:35 a.m.
9.	Review Noncompliance Findings (If Necessary) **Action**	9:50 a.m.
10.	Other Business	9:55 a.m.
11.	Adjourn	10:00 a.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

ISFMP Policy Board
August 8, 2024
8:30 – 10:00 a.m.

Chair: Joe Cimino (NJ) Assumed Chairmanship: 10/23	Vice Chair: Dan McKiernan (MA)	Previous Board Meeting: May 2,2024
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (19 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from May 2024

3. Public Comment – At the beginning of the meeting, public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance, the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Executive Committee Report (8:45-8:55 a.m.)

Background

- The Executive Committee will meet on August 7, 2024

Presentations

- J. Cimino will provide an update of the Executive Committee Work

Board actions for consideration at this meeting

- None

5. Update on American Eel Convention on International Trade of Endangered Species Activity (8:55-9:10 a.m.)

Background

- FWS is considering listing eel as an Appendix III in CITES which would mean any eel or eel product export would need a certification that the product/eel was legally caught and legally purchased before leaving the country. An appendix III listing is an option a country can choose to do, it is not required by CITES. Trade in an Appendix III species is regulated using CITES export permits (which would be issued by the USFWS) and certificates of origin (issued by all other countries).

- The Commission, with the Association of Fish and Wildlife, sent a letter to the USFWS expressing concerns regarding the potential listing of American Eel in CITES Appendix III (**Meeting Materials**)

Presentations

- Update on American Eel Convention on International Trade of Endangered Species Activity

Board actions for consideration at this meeting

- None

6. Discuss H.R. 8705, the *Fisheries Data Modernization and Accuracy Act of 2024* (9:10-9:25 a.m.) Possible Action

Background

- The H.R. 8705, the Fisheries Data Modernization and Accuracy Act of 2024 (**Meeting Materials**), introduced by Representative Graves of Louisiana, has had one legislative hearing in front of the House Committee on Natural Resources. In this hearing members generally discussed the purpose of the bill and their support for or against it. The next step in the process is a bill markup in the House Committee on Natural Resources. Here they will discuss the finer points of the bill and consider amendments to it. Rep. Graves is waiting on NMFS's technical analysis of the bill before they request it to be marked up. Depending on NOAA's timing this could be anytime after the beginning of September.

Presentations

- Staff will provide an overview of H.R. 8705 and

Board actions for consideration at this meeting

- Provide feedback on issues the Commission supports/does not support within the bill

7. Presentation of National Fish and Wildlife Foundation Electronic Monitoring and Reporting (9:25-9:35 a.m.)

Background

- The National Fish and Wildlife Foundation will award up to $4.8 million in grants that catalyze the voluntary implementation of electronic technologies for fisheries catch, effort, and/or compliance monitoring, and improvements to fishery information systems in U.S. fisheries. The Program will advance NOAA's sustainable fisheries goals to partner with fishermen and other stakeholders, state agencies, and Fishery Information Networks to systematically integrate technology into fisheries data collection and observations as well as streamline data management and use for fisheries management.
- An RFP has been released and proposals are due by October 2, 2024

Presentations

- W. Goldsmith will provide and overview of the program as it pertains to Commission species. (**Meeting Materials**)

Board actions for consideration at this meeting

- None

8. Committee Updates (11:35-11:40 a.m.) Action

Background

- The Habitat Committee met on July 22, 2024 to finalize the Habitat Management Series (HMS): *Anthropogenic Noise Impacts on Atlantic Fish and Fisheries: Implications for Managers and Long-Term Productivity* (**meeting materials**) and discuss the next HMS topic as well as topics for the 2024 Habitat Hotline
- The ACFHP met in May of 2024 to discuss FY 24 and 25 fish habitat restoration projects, completed ACFHP supported projects and the application for Congressional Designation to NFHP Board
- The Assessment Science Committee met to update the Commission's stock assessment schedule

Presentations

- S. Kaalstad will present on actives of the Habitat Committee, including a presentation on the latest HMS: *Anthropogenic Noise Impacts on Atlantic Fish and Fisheries: Implications for Managers and Long-Term Productivity*, as well as the actives of the ACFHP
- J.Patel will present an updated Commission stock assessment scheduled

Board actions for consideration at this meeting

- Consider the approval of the HMS: *Anthropogenic Noise Impacts on Atlantic Fish and Fisheries: Implications for Managers and Long-Term Productivity*
- Consider the updated Commission stock assessment schedule

9. Review Non-Compliance, If Necessary Action

10. Other Business/Adjourn (10:00 a.m.)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ISFMP POLICY BOARD

The Westin Crystal City
Arlington, Virginia
Hybrid Meeting

May 2, 2024

TABLE OF CONTENTS

INDEX OF MOTIONS

ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Cheri Patterson, NH (AA)
Dennis Abbott, NH proxy for Sen. Watters (LA)
Doug Grout, NH (GA)
Dan McKiernan, MA (AA)
Jason McNamee, RI (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (RI)
Justin Davis, CT (AA)
William Hyatt, CT (GA)
Marty Gary, NY (AA)
Scott Curatolo-Wagemann, NY, proxy for E. Hasbrouck (GA)
Amy Karlnosky, NY, proxy for Sen. Gopal (LA)
Joe Cimino, NJ (AA)
Jeff Kaelin, NJ (GA)
Adam Nowalsky, NJ, proxy for Sen. Gopal (LA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Lynn Fegley, MD (AA, Acting)
Shanna Madsen VA, proxy for J. Green (AA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Ben Dyar, SC, proxy for Blaik Keppler (AA)
Chris McDonough, SC, proxy for Sen. Cromer (LA)
Doug Haymans, GA (AA)
Jeff Renchen, FL, proxy for J. McCawley (AA)
Gary Jennings, FL (GA)
Ron Owens, PRFC
Mike Ruccio, NOAA

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Staff

Bob Beal
Toni Kerns
Tina Berger
Alexander Law
Madeline Musante
Chelsea Tuohy
Caitlin Starks
Emily Franke
James Boyle
Tracey Bauer
Katie Drew
Kristen Anstead
Jeff Kipp
Pat Campfield
Kurt Blanchard

Guests

Max Appelman, NOAA
Mike Armstrong, MA DMF
Alan Bianchi, NC DMF
Tom Bleifuss, USCG
Jason Boucher, NOAA
Robert Boyles
Jeffrey Brust, NJ DFW
Michael Celestino, NJ DFW
Richard Cody, NOAA
Brain Collins
Jennifer Couture, NEFMC
Jessica Daher, NJ DEP
Chris Dollar, Coastal Cons. Assn.
Mitchell Eigabaum
Julie Evans, East Hampton Town Fisheries Advisory Cmte.
James Fletcher, Unites National Fisherman's Assn.
Anthony Friedrich, ASGA
Sarah Gaichas, NOAA
Alexa Galvan, VMRC
Keilin Gamboa-Salazar, SC DNR
Matthew Gates
Pat Geer, VMRC
Lewis Gillingham, VMRC
Jamie Green, SC DNR
Melanie Griffin, MA DMF
Hannah Hart, MAFMC
Jesse Hornstein, NYS DEC
Todd Janeski, VCU
Robert LaCava, MD DNR
Laura Lee, US FWS
Tom Lilly, Menhaden Project
John Maniscalco, NYS DEC
Tara McClintock, Cornell University Cooperative Extension
Kevin McMenamin, Annapolis Anglers Club
Meredith Mendelson, ME DMR
Alex Mercado, Cornell Cooperative Extension of Suffolk County
Nichola Meserve, RI DEM
Steve Meyers
Brandon Muffley, MAFMC
Ed Mullis, B&C Seafood Inc.
Allison Murphy, NOAA
Thomas Newman, North Carolina Fisheries Assn.

Guests (Continued)

Jay Odell, Monmouth University Urban Coast Institute
Anna Quintrell, NOAA
Jill Ramsey, VMRC
Sefatia Romeo Theken, MA DFG
Daniel Salerno, NEFMC
Tara Scott, NMFS
McLean Seward, NC DEQ
Amanda Small, MD DNR
Somers Smott, VMRC
Renee St. Amand, CT DEEP
Kristen Thiebault, MA DMF
Chad Thomas, NC Marine & Estuary Foundation
Mike Waine, ASA
Kelly Whitmore, MA DMF
Angel Willey, MD DNR
Travis Williams, NC DEQ
Chris Wright, NOAA
Daniel Zapf, NC DEQ
Renee Zobel, NH FGD

The Interstate Fisheries Management Program Policy Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person and webinar; Thursday, May 2, 2024, and was called to order at 10:00 a.m. by Chair Joe Cimino.

CALL TO ORDER

CHAIR JOE CIMINO: Good morning, everyone, my name is Joe Cimino; I'm the Administrative Commissioner for New Jersey, Chair of the ASMFC. I'm going to call to order the Interstate Fisheries Management Plan Program Policy Board, and begin the wrap up of our meeting this spring.

APPROVAL OF AGENDA

CHAIR CIMINO: We're going to go for Board Consent on Approval of the Agenda. Are there any changes or additions to the agenda? Seeing none.

APPROVAL OF PROCEEDINGS

CHAIR CIMINO: Also, Approval of the Proceedings from our January meeting. We have a motion from Pat to approve, second. We'll consider that approved by consent.

PUBLIC COMMENT

CHAIR CIMINO: Any Public Comment for items not on the agenda? It looks like we have one. It looks like we have two, so go ahead and we'll give two minutes. Sorry, please introduce yourself.

MR. MITCHELL FEIGENBAUM: Yes, my name is Mitchell Feigenbaum; I'm the Chairman of the Advisory Panel for American eel. I'm a former Commissioner in the role of the Proxy for the Pennsylvania Legislative Rep. I've been a member of the AP for approximately 18 years, and I've devoted my entire adult professional life for the last 25 years to the American eel business industry and regulatory management in both Canada and the U.S.

It's very difficult to restrain my comments to two minutes. I refrained from making public comments during earlier meetings, as well as at the Executive Committee, and was hoping to engage in maybe ten minutes of discussion about a very vital matter, but I'll do my best and we'll see where it goes.

I shared these comments with the Law Enforcement Committee yesterday, and I also shared some thoughts in a little bit more elaborate form in some comments that were added to the supplementary materials to the American eel package that was sent out to all Board members. There is a serious problem in the Canadian glass eel fishery, it is spilling into the U.S., and it will only increase in coming years, unless the ASMFC plays its part in helping to address them.

Canada has become the hub for the illegal unregulated and unreported trafficking of baby eels. The situation is described in the Shiraishi and Kaifu report included in the meeting materials, which Commissioner Miller referred to yesterday. That report states that Hong Kong imported 150 tons of glass eels from the Americas in 2022, 100 tons from Haiti, 42 tons from Canada, 13 tons from the U.S. With certainty, I can assure the Commission that those numbers are grossly exaggerated. Still, they reflect a terrible reality. Criminal organizations involving glass eel smuggling are creating false records and engaging in fraudulent tactics to hide and mislabel a vast number of lookalike eel species, that Hong Kong and Chinese importers bring from all over the world.

False documents changed the apparent origin of illegal eels to make them appear legal. False practices enable criminals to increase the value of cheap eels from places like Indonesia, Africa and the Philippines, by recasting them as highly valued American eel. Organized criminals behind the problem include and are dominated by powerful Chinese interests, Haitian gangs, and native leaders in Canada that do not recognize that country's right to regulate their activities.

CHAIR CIMINO: Mitchell, if you will. I appreciate you being here, and representing the AP for eel. Personally, I just want to say that I agree that this is important. But having you rush through this is probably not the best way to get this information to

us, since you are an Advisor, I would encourage you to send information to staff.

MR. FEIGENBAUM: If I may respond, I have sent the information, and I would appeal to the Chairman and the Commission to indulge me for another two or three minutes at least, to frame the issue, and why I feel it is a matter of ISFMP Policy. While I don't expect the Commission to take up the substance of my requests, suggestions and current concerns today, I would like to get them out on the record, and I can certainly do so in another three minutes.

CHAIR CIMINO: Adam.

MR. ADAM NOWALSKY: I would kindly request, Mr. Chairman that you see what other participants of the public want to comment, and if they are limited or not, I would request that we defer time from the time that is already on the agenda to hear Mr. Feigenbaum out for a couple more minutes.

CHAIR CIMINO: Pat.

MR. PATRICK C. KELIHER: I was not going to speak about additional time, but I was going to ask for this to be added under Other Business, because I've been very engaged with Canada on this particular issue, and I have something to add to the Board, and potentially a request for a letter to do it.

CHAIR CIMINO: Mitch, we're going to make time because of that, and I apologize. I'm going to give you the option to let us take this up in Other Business, if that is all right with you.

MR. FEIGENBAUM: No apology is necessary. I appreciate the attention and the ability to speak at the appropriate time, and I would be happy to defer my comments until that section of the meeting.

CHAIR CIMINO: We'll do that, thank you. I believe we have two others.

MS. TONI KERNS: Jim Fletcher, and Jim, you just need to unmute yourself.

MR. JAMES FLETCHER: James Fletcher, United National Fishermen's Association. I have a question. With the sturgeon being managed the way they are, and the dogfish being managed the way they are, it looks like we're going to be landing smaller fish, and that is going to require the building of processing equipment. My question is, does ASMFC or anywhere in the system, other than Sea Grant, have funds available to develop equipment to handle small dogfish? Is there any money in ASMFC to develop equipment, any grants? Sea Grant is not an option.

MS. KERNS: Jim, there is not any funding for changes in processing by the Commission at this time. I think the Dogfish Board can ask for implications to the changes in the Dogfish Fishery, relative to the needed changes for protections to Atlantic sturgeon though, as a part of the draft Addendum document. Next on the list was Tom Lilly, if that is helpful.

CHAIR CIMINO: Go ahead, Tom, you have two minutes.

MR. TOM LILLY: Tom Lilly from Whitehaven, Maryland. Fishermen, Charter Captains and 22 conservation groups like Audubon, Sierra Club, Interfaith Partners of the Chesapeake, and the Lutheran Congregations, have joined together in a resolution, asking you to end the factory fishing in Virginia.

These groups represent the values of more than 500 thousand people across Chesapeake Bay. The poor condition of the Bay wildlife is damaging their quality of life and that of their children and my grandchildren. Are you going to take action now to consider what they want? Your charter requires a fish management plan to reflect the values of the interested groups.

There are two peer reviewed scientific articles concerning Virginia Ospreys that are dying off due to menhaden overharvesting. In the study area in Virginia, 150 of 167 nests failed completely. This means that all of the babied in 150 nests starved to death, most during the first week of life.

There is a saying in law and ethics; "Res Ipsa Loquitur, the thing speaks for itself." It speaks for action now. Board members, isn't that what you have here, right in front of you here? This Board can take action right now by asking on this problem right now, by asking the staff and relevant committees to meet with the sponsors of the resolution and other interested groups in the next month, to move forward with management options to solve this problem. Will you do that? Res Ipsa Loquitur.

CHAIR CIMINO: We have one other, go ahead, please introduce yourself.

MR. BRIAN COLLINS: My name is Brian Collins; I'm a concerned citizen from Alexandria, Virginia, and I just wanted to make a couple comments. I'm part of a Citizen Public Community dialogue, and I wanted to share with you the concern that ASMFC is losing credibility with the sportfishing community and the public, and here is why. It appears you are not acknowledging the Chesapeake Bay as a separate ecosystem from the ocean. You manage menhaden as a single stock. You don't have any shared scientific data to support your Bay menhaden quotas. Your ocean and Bay quotas overlap. At the mouth of the Bay, you allow another 230 million pounds to be taken, in addition to 112. Those aren't acknowledged, but we know the fish come in and out of the Bay, that is the problem. Your striped bass regulations do not acknowledge the fact that the Chesapeake Bay is a nursery for the majority of the east coast striped bass stock. Striped bass live in the Bay nine years before heading to the ocean when they're 32 inches long.

That is a captive audience that we need to feed, and it doesn't appear that that is incorporated in any of your science. All the blame is put on sport fishing. Osprey nest thing is failing in higher salinity areas, and nobody believes that historical catch of menhaden is a reasonable metric for validating a quota of 112 million pounds in the Bay. That is like a federal agency getting their funding every year to spend it all to validate it.

We have some members of your community that are saying we have data that documents how many menhaden we have in the Bay, and how many we need. But none of that data is shared with the public. It appears there is no common sense being used in your quota management, and all appearances are from the public, because of the things I've said. It appears that you are beholden to special interest, and I appreciate your time to offer public comment. Thank you.

CHAIR CIMINO: Thank you for your time, appreciate that. I know there has been considerable discussions and frustrations with menhaden management, and we are, I hope getting the message across that we are listening and doing our best to explain how our multispecies approach is working, and we will continue to do that. I'm going to move on. Next item is from me.

EXECUTIVE COMMITTEE REPORT

CHAIR CIMINO: The report on the Executive Committee; we've got two major items. One being the fiscal year budget, well I think both major items are something that we are just extremely fortunate as a Commission to have, incredible staff that have been running things very smoothly, and no surprise. In Laura's sector, we went through the fiscal year '25 budget.

I don't know if there are any particular comments from Executive Committee members on the budget, but we're in a situation where even with a couple of law suits that the Commission is either dealing with directly, or more tangentially, there is money available to deal with that, and other issues that have popped up.

We had a motion to accept the fiscal year budget from our AOC out to the Executive Committee, and that passed unanimously. We went through a legislative update with Alexander, and I think most of you are pretty familiar with where we are there. We went through the future annual meeting update.

I will just give you the preface, which is that we will be meeting in Annapolis this October, I believe. Yes, this October, and so that is pretty exciting, with folks from Mid-Atlantic Fishery Management Council are

familiar with the location, it's a very nice spot. Lastly, we went through the Executive Director's performance review, and well, once again we left Bob off.

No, we're just extremely appreciative of Bob's leadership, his direction here when he needs to step in and get us untangled. It's just incredible performance of everyone on staff that we are somewhat attributing to Bob. I'll leave it at that. Next up is the 2024 State of the Ecosystem Report, sorry, go ahead, Pat.

MR. KELIHER: I'm sorry, Mr. Chairman, but within your chairman's report, one of the things we also considered were our priorities out of the legislative and appropriations priorities. Upon conversations yesterday, and then listening to the Spiny Dogfish conversation as it pertained to sturgeon. It highlighted the fact that to me, that we also missed an area within our priorities, which were species recovery grants under Section 6. It is not listed as one of our priorities.

Bill Hyatt, our Legislative Committee Chair sent out an e-mail to the Legislative Committee this morning saying we should revisit that. Since we're all here, I would urge that we add that as a priority. It has certainly been a priority for the state of Maine. It's been zeroed out, along with many other items within the President's budget, but it's going to be key for all of the states in the northeast and mid-Atlantic, as we continue to work on sturgeon related issues. I thought I would pass that along for consideration.

CHAIR CIMINO: Yes, that is great. Thank you, Pat. I'm going to open it up then to the Policy Board, any comments on what Pat, and I guess Bill have brought up. Any further thoughts on that? If not, is there any objection to adding that as a priority? I don't see any objections, thank you, Pat, and thank you, Bill, I appreciate that.

2024 STATE OF THE ECOSYSTEM REPORT

CHAIR CIMINO: The 2024 State of the Ecosystem Report is something that, well, the state of the ecosystem report is something that some Commission members may not be familiar with. But folks from the New England and Mid-Atlantic Fishery Management Councils are. It's something that plays into our important reviews for MSA actions for our risk policies, socioeconomic stuff in general, climate change stuff in general. I think especially in the climate scenario planning context, I would hope that Board members would take into account this just tremendous report that we get every year.

It has been added to over the years, it has been honed. Sarah will go through all the contributors and the amount of work that has gone into this. I'll just add that for a lot of us, it's one of the favorite presentations we get within a year, and Sarah is kind of our T. Swift, to be honest with you. I'm going to introduce Sarah Gaichas, and let her go through the State of the Ecosystem Report. Go ahead, Sarah, when you're ready.

DR. SARAH GAICHAS: I'll confirm that you can hear me and you can see my screen.

MS. KERNS: Hold on, Sarah. I made you the presenter on my computer, but it doesn't carry over to the main, we can hear you.

CHAIR CIMINO: Yes, we can hear you fine. Toni said, we have it on either the webinar, at least hers, but not yet in the room, Sarah, so give us a second.

MS. KERNS: We are good now.

DR. GAICHAS: Great, all right, well I will roll on. Well, first of all thank you very much for taking this report. What I'm going to give you is a very abbreviated version of what either the Mid-Atlantic or the New England Councils would get. But I welcome any questions or feedback that the Commission has on this report, and we would love to make it more useful to you as well, to the extent that we can. First, I'll acknowledge the other main contributors here though. Caracappa is the editor of the New England Report.

I am the editor of the Mid-Atlantic Report, and then we have a long list of people who have been working on the data in the sections here. The contributors to

the SOE are a slide with at least 80 names on it at the end of this, so I'll get to that soon. Please jump in if something goes wrong with audio, or I say something that doesn't make sense. I welcome that. Just on background on the State of the Ecosystem, or you'll see the acronym SOE.

The idea on this report, for those who aren't familiar, is to improve the ecosystem information and synthesis that we can get into the fishery management system. The idea here is we are showing ecosystem indicators that are linked to the management objectives, very general management objectives. This is contextual information.

The Councils do not take direct action based on this report, but it is intended to provide context for other actions. We've been producing the report since 2016, and evolving it with our management partners, and it is intended to be a fishery relevant subset of what might be a full ecosystem status report.

We don't try to cram everything into this, but just keep it focused on fishery management objectives. We have an open science emphasis. The data, the methods, everything is available to anyone who would like to use them. This report is used within the Mid-Atlantic Fishery Management Council's Ecosystem Process. There are several papers there that you can see.

It basically feeds into the Risk Assessment, and then the Risk Assessment feeds into conceptual modeling and management strategy evaluation at the Mid. Just to give you an idea of the structure of the reports, and some minor changes we've made for 2024. We began the report with summary pages, and that is mostly what I'm going to go over today, just to give you a brief overview.

There is a graphical summary, Page 1 is always a report card relative to management objectives, and the table on the right-hand side there are the objectives that we're looking at. These are broadscale management objectives pulled from national legislation, and guidance on implementing that legislation.

It's things like the definition of optimum yield for federal fisheries is maximizing benefits to the nation, in terms of food production and recreational opportunities. You'll see seafood production and recreation on there. Obviously, we're also trying to have economically viable fisheries, stable fisheries. We have social and cultural objectives and protected species objectives.

In order to have those things happen from the ecosystem, there are some supporting and regulating ecosystem services that are necessary, so we also look at things like biomass, productivity, trophic structure, and habitat as objectives. There is a list of the types of indicators that we report that are aligned with each of those objectives there. Page 1 of the Mid-Atlantic Report and Pages 1 and 2 of the New England Report are these report cards. The next page is summary bullets of risks to meeting management objectives, and then Page 3 is new for this year.

It's Page 4 in the New England Report, is a snapshot of 2023, some conditions that we noted and wanted to bring to managers, so that everyone would know about them, in as close to real time as possible. Then Section 2 of the report is going into detail on the performance relative to management objectives, and Section 3 is going into detail on the risks to meeting those objectives.

This year we have updated the climate and ecosystem risk section, in order to better align it with some of the types of decisions that you make. We also highlight risks that come from offshore wind development. I won't have time to go over those today, but it's not to say there would be no benefits from offshore wind development, but again, these reports are focused on fishery management and what the risks might be from that use of the oceans.

That is the structure. We have some themes for synthesis, so we're trying very hard not to just make this a list of indicators. What we would like is to be able to integrate them and really synthesize what the main messages might be, in terms of management implications. There are three ways that we characterize ecosystem change.

The first is that there are multiple system drivers. There are social, biological, physical, and chemical factors that can drive what we see in marine ecosystems. There are a lot of different pathways. What we try to do, obviously we don't have all the answers, but what we try to do is disentangle some of those pathways, to the extent that we can when we see a change.

I'll show you an example of that. The changes in those drivers can lead to regime shifts, and this we define as a large, abrupt, and persistent change in the structure and function of the ecosystem. I'm currently in a workshop for the next two days, where we're hoping to get more clarity on what we mean by all of these words, and some scientific consensus.

Right now, the reports don't emphasize this too much. But in the future, we would really like to be able to tell you if we've seen one of these large and abrupt changes across many different things in the ecosystem. Regime shifts and changes in the drivers could result in ecosystem reorganization, as everything in the system is responding to new environments.

That is the picture you're seeing there on the bottom right-hand side. It's not to say that different regimes are better or worse, they are just different, and so we need to understand how they work, in order for management to be effective within that regime or reorganized ecosystem, if that happens. Like I said, right now we mostly emphasize multiple system drivers, but we're moving towards being able to understand whether there has been a regime shift or not, and whether that has resulted in new organization for you to consider in management.

Brief words on the scale and figure. You've gotten both reports from Mid-Atlantic and New England. The Mid-Atlantic state of the ecosystem report covers generally indicators for the Mid-Atlantic Bight there in light blue in the map, and the New England report covers indicators for both the Gulf of Maine and Georges Bank in the darker blue colors on the map. But there are some indicators that are coastwide, and I'll show you a couple examples of those today. Everything in red here in these slides is a link to an online supplement, so there is a glossary of terms, technical methods, the data itself, and a catalogue going into detailed indicators.

They are all available online, and we welcome feedback on any of that information to make it more useful to you. So that you can understand the standardized figures to the report, this is kind of a key, and what we're using here is one of our indicators on changes in a long shelf distance and depth of all of the species together on the Northeast Fisheries Science Center Trawl Survey.

Our time series figures will have time on the X axis, obviously, and they'll have whatever the indicator is listed on the Y axis, and then the black dots are the observations, the lines can connect them, and if you see an orange line that means there is a significant increase in the indicator. If you see a purple line that means there is a significant decrease in the indicator.

The gray shading in the end is showing you the most recent ten years, just so you can orient to what the most recent years have been doing relative to the whole time series, and the dash line is the time series average. Just so you know, like now are we above or below the time series average. We only assess trends for 30 plus years right now, but that may change next year.

If you don't see a line, either the time series is less than 30 years, or there is no significant trend. That is a little orientation there. I'm just going to go through the results of al of the reports right now, and then I'll walk you through a couple of examples. Obviously, we won't go through everything.

But for the Mid-Atlantic the performance relative to management objectives is listed on the first page, and you're not going to be able to read this, I'm just going to walk you through what it says. We do trend, status and implications on the first page. Both seafood production and profits are showing long term declining trends in the Mid-Atlantic, and both are below the long-term average right now.

Recreational opportunities are kind of a mixed bag, so effort is up and above long-term average, but

effort diversity, in terms of number of different kind of sectors of the recreational fleet is actually declining significantly and below the long-term average. Our stability indicators are fairly mixed and mostly showing stability in both the fisheries and the ecological side.

We have social and cultural indicators that are not trend indicators, but just status. Those look at fishing engagement and reliance by fishing communities, and environmental justice vulnerability by community. The engagement and reliance characterize the fishing community, but the environmental justice vulnerability characterizes the entire municipality of that community.

That helps people understanding if the major fishing communities are facing challenges, in terms of just community structure that might be affected by, say climate change or regulatory change. Then for protected species objectives, we have two of them that we highlight, maintaining bycatch below thresholds. Those objectives are currently being met for harbor porpoise and gray seals, although the trends in bycatch are mixed between those two, and recovering endangered populations. The Mid-Atlantic and across all the systems, that is NARW is North Atlantic Right Whale, and as I think everyone knows that population has a declining trend right now and is still well below its recovery target. That is where we're at with protected species. Now I'll go through, we have the same page for New England, but we split them into two, because we emphasized Georges Bank indicators and Gulf of Maine indicators separately.

What you see is slightly different story on Georges Bank. Seafood production is basically total production does not have a trend, but the species managed by New England Council are declining, and both are below the long-term average. Similarly, profits do not have a trend, but they are currently above the long-term average on Georges Bank.

Recreational opportunities are not showing trends, either in effort or effort diversity, and are just about around the long-term average for stability. This also is similar to the Mid-Atlantic in that the trends are kind of mixed, but commercial fisheries, stability as the diversity indicator is actually down on Georges Bank, whereas the recreational and ecological indicators are all kind of mixed in there with the long-term average indicating relative stability.

Same indicators but for New England, for social and cultural, and protected species have basically the same as in the Mid-Atlantic, except gray seal can be looked at here. That species is actually above the long-term average and increasing. Similarly in the Gulf of Maine, I've grayed out the ones that are identical between Gulf of Maine and Georges Bank.

But in Gulf of Maine, seafood production is again different, so long term declining trend and below the long-term average, more similar to the Mid, and profits are above the long-term average for total, but declining and below long-term average for New England managed species. The additional endangered species. here in the Gulf of Maine is salmon, and that is showing a downward trajectory and below long-term average.

When we start to look at risks to meeting fishery management objectives, that kind of combines those for both reports on this slide, and I'll go through one of these in detail for you. But right now, the way we've organized these is to talk about risks to spatial management, to seasonal management and to quota setting and rebuilding. What are those risks, that climate is posing to those? In summary, what we're seeing are definitely shifts in fish and protected species distributions. I'll show you those.

We're also seeing change in spawning and migration priming, which might have implications for any regulations that are trying to align seasons with when fish are available, or when they are spawning or not spawning. Also, we are seeing multiple stocks with poor conditioning and declining in productivity.

For other ocean uses, we focus on offshore wind development, and what we list in the report is current revenue in the proposed lease areas. That could be up to 23 percent by Mid-Atlantic ports, and 34 percent by New England ports, and some of these ports do have environmental justice concerns that

may make them have a harder time adjusting to change. For the species themselves it is up to 20 percent of revenue by Mid-Atlantic managed species and up to 54 percent by New England managed species. There are overlaps of offshore wind areas with important right whale foraging habitats, which potentially increases vessel strike and noise risks. In the Gulf of Maine there is an integrated ecosystem assessment in progress, that is looking at Gulf of Maine fisheries and offshore wind. That could be some information that would be useful to you all in the future.

This is our highlights of 2023. This is a new summary page this year, and we welcome feedback on this if you think this type of thing is useful. It's the first time we've done it. The notable events in 2023 include construction actually starting on some of these wind projects. In South Fork and Vinyard Wind 1 started construction.

There was a scallop die-off in the Elephant Trunk between 2022 and 2023. We were noting hypoxia and mortality events in New Jersey coastal waters over the summer in 2023. However, there was record low hypoxia in Chesapeake Bay. It shows that these conditions really can change spatially.

We had a summer phytoplankton bloom that was just off the scale in the Gulf of Maine, and the Gulf of Maine had the second ranked bottom temperature heat wave that we've noted over the time series that we've got. There was warm water everywhere in the northwest Atlantic, except in spring on the northeast U.S. shelf.

Again, these conditions can really vary here locally. We're seeing a lot of changes in the Gulf Stream that alter the shelf break habitats that could be really important to some of the squid fisheries and other fisheries out on the edge. This was an El Nino year in 2023, it was the warmest year on record globally, and again is there because we do report quite often that we just had the warmest year on record globally. That is a trend that continues.

I'm just going to take the remaining time here and walk you through a couple of more in depth examples. The Councils would get the full report, but we'll spare you that today. I'm going to walk you through what the seafood production objective looks like, in terms of the indicators for both the Mid-Atlantic and New England.

The indicators we have for seafood production, which is again declining and below the long-term average, are commercial landings over on the left-hand side of the screen, and recreational harvest on the right-hand side. You can see those purple lines for significant decrease in trends for several of our indicators.

The question is, what is driving this? What we try to do in the report is go through and look at things like ecosystem and stock production, management actions, stock status, market conditions, environmental change, et cetera, to try to sort out what may be driving this. In the Mid-Atlantic the first thing we look at is stock status, and that is the plot on the left-hand side.

I think you can see most of the Mid-Atlantic stocks are in pretty good shape. They've got good status, there are a couple that are below the biomass limit. There is one below the biomass limit, a couple below the target, and one that is currently above the fishery management fishing mortality threshold. But in general, most of these stocks have decent status, so it suggests that stock status alone is driving the landings in this region. We also look at total ABC or ACL, and the realized catch relative to the management target, and in the Mid-Atlantic this is fairly flat for the last decade or so. It suggests that it isn't big changes in allowable catch that are driving landings declines. Similarly, the catch within that target has been mostly within the target, so the red line in the plot below here on the lower right-hand side is where the median catch is across all the years.

There are a few things that go above the allowable catch, but for the most part things are below. It suggests that they don't really have binding limits most of them, and management is likely less to be playing a role in that landings decline so much. We can look at biomass in the ecosystem, and that too doesn't appear to drive the landings trend.

What you're seeing here are spring and fall, the two columns on the left-hand side, with piscivores, benthivores, planktivores and benthos. Basically, your different trophic levels of biomass in the ecosystem from both the Northeast Fisheries Science Center Bottom Trawl Survey and the NEAMAP Survey in red.

None of these have declining trends, basically, a couple of them have increasing trends. That suggests it's not overall biomass in the system. What we look at here then is we break up those landings into those same trophic levels, and we can ask, well which portions of those might be driving it. We see two negative trends, one is planktivores in the Mid. This is actually the long-term fishery consolidation in the menhaden fishery that is driving this trend here.

Then for benthos in the Mid, we're seeing both in red. That is Mid-Atlantic managed benthos, that is surf clams and ocean quahogs, and then black it adds the New England managed ones, so that is scallops. Basically, the suggestion here is its markets for the surf clam and ocean quahogs, because they are not currently hitting their quotas.

Possibly availability of scallops that are driving this decline in landings for benthos in the Mid-Atlantic. The reports suggest continue monitoring for things like climate risk, because benthos is really economically important, and also somewhat susceptible to things like ocean acidification and temperature, and to keep monitoring things like ecosystem, composition and production changes that are shown later in the report, as well as changes in fishing engagement, which can all effect landings.

For the story of New England, similar decline in commercial and recreational landings, but possibly different drivers in New England. We go through the same set of indicators, and in New England there are actually more stocks that have status that would require rebuilding. That does suggest that keeping landings low to allow rebuilding is one of the reasons that we see lower landings in New England.

A survey biomass though looks a lot like in the Mid-Atlantic, we don't see big declining trends here, so that suggests biomass is an unlikely driver for the landing's trends in New England, and we can break those up similarly to the Mid-Atlantic, and ask what's going on here? We do see declines in piscivores in both Georges Bank and the Gulf of Maine, and planktivores in the Gulf of Maine, benthivore's in Georges, so a lot of these do have to do with requirements to rebuild some of the individual stocks, which may actually constrain fisheries for other stocks, as well as market dynamics. There are probably other things affecting recreational landings though. For sharks it's fishery management, and possibly the survey methodology that we use for understanding recreational fishing.

The same recommendations to monitor changes in the ecosystem for landings drivers in New England. Slightly different story, maybe different drivers, but that is an example of how we try to look at multiple system drivers. I'll just briefly show you one of our risk sections for meeting fishery management objectives, that is fish distribution shifts and Cetacean distribution shifts, so these are risks to spatial management.

We are, as you know, seeing changes in distributions all across the ecosystem. These are coastwide indicators are in both reports. We see this increase in a long shelf distance. That means basically everything is moving to the northeast, in terms of fish and invertebrates on the Northeast Fisheries Science Center Bottom Trawl Survey.

They are also moving into deeper water over time. For Cetaceans this one is broken up by seasons. You see a lot of these species are moving in the same direction, with some moving in a different direction by season. It's not always in the same direction, but there is a lot of movement going on out there with a lot of our managed populations.

Some of the drivers potentially of that, could be forage fish shifting. It could be changes in temperature and changing ocean habitat. Just briefly, some of the indicators on those, we're seeing eastward and northwards significant increases of forage fish in the fall, all across the shelf. We're

seeing a long-term increase in sea surface temperature.

I think that is well known to everyone, but especially the last decade has been very warm. We're seeing a change in the Gulf Stream, where it is getting further north along the coast, and that will change the habitat available to these species, and potentially drive distribution shifts. Another important component of the habitat is the Mid-Atlantic cold pool.

We're seeing that cold pool gets both warmer over time and smaller over time. These changes in habitat temperature and forage will all probably drive some of these changes in distribution that we're seeing. The outcome here is we're suggesting that the distribution shifts are basically unlikely to flip back, they are likely to continue.

What we're hoping to have online soon is near term oceanographic forecasts, but we're going to have to also understand how some of the changes in ocean habitats are affecting these species. The good news is, I think, ASMFC as well as the Councils are involved in the East Coast Climate Scenario Planning, which I think will help coordinate some of the management here, and there are a lot of projects going on with near-term predictions of distribution shifts.

Hope to bringing more information on this in the future. I'll just end with the 2023 highlights, because these may be of interest to folks on the Commission. We're seeing hypoxia, like I said, and ocean acidification off New Jersey in 2023, so the pink line over here in the middle plot is showing you where there were dissolved oxygen less than three milligrams per liter. That is kind of a big deal in the coastal ocean, doesn't happen very often. The red exes are showing where there were mortality events. But again, like I said, it was record-low hypoxia in Chesapeake Bay, so it is not like a blanket statement, how things are changing in the oceans here. The sea scallop recruitment that was detected to be strong in spring of '22 was basically gone in 2023, and we think this was a mortality event.

What we're showing over here on the right-hand side of the screen is the number of days in 2022 where bottom temperatures were at or above the scallop stress temperature, about 17 to 19 degrees C, and this box here is the Elephant Trunk Area, and the light green is showing you that those temperatures at the bottom, what was stressful for scallops, were experienced for over a month in 2022.

That is some suggestions that we are seeing enough changes in the habitat that could start to affect some of these important commercial and recreational species. The other thing, like I said, the Gulf Stream was actually inshore and had fewer rings in 2023, so this can affect things like the offshore Illex fishery, as well as any of the other fisheries along the shelf.

We did see warm waters get all the way up onto the shelf, which can be episodic events that could threaten some of these species, especially the ones that aren't mobile, like scallops. We don't know the implications to this yet, but it's something we'll be keeping an eye out for, for future reports.

Similarly, there was a huge phytoplankton bloom in the Gulf of Maine, as well as a bottom heat wave, so you're seeing it in the plot, the red is how much higher it was than normal for the chlorophyl in the Gulf of Maine, it spread down into Georges Bank, a little bit into the Mid. You can see the green line is the chlorophyl for each of our regions, Georges Bank, Gulf of Maine and Mid-Atlantic, and you can see the Gulf of Maine this summer was off the charts here.

This was not a species that is typically eaten by a lot of things, so it's not clear that it's going to make its way into the food web. The jury is still out on what impacts this might have, but again, we'll keep an eye on this for everyone and report back next year. I want to thank everyone for your attention. I know that was kind of a whirlwind, but I just wanted to give you a taste of what the reports are like.

This is a list we hope that is complete, of the people who are contributing to this report, there are many. There are at least 20 institutions, at least 80 contributors here, and we have to thank them all, because this could not be done without them. I'll

leave you with some references and also, these are links to the additional resources, for anyone who would like to follow up, and I welcome any questions or feedback. Thanks very much.

CHAIR CIMINO: Thank you, Sarah, that was fantastic, and as enjoyable as the longer presentations are for the Councils, I truly appreciate getting this out to the Commission, and you taking the time to help us do that. I think it is a tremendous tool. There are many elements of the report now, I think that are just stuff that states can have at their fingertips that they just couldn't do on their own. I encourage anyone who hasn't looked at these reports, to please do so. As Sarah said, she is ready for questions or she would appreciate feedback or comments. I'll look for hands. Jason McNamee.

DR. JASON McNAMEE: Doctor, great, just thank you very much, great presentation. Always really enjoy these, as Joe mentioned. I look forward to them. Another great, or I guess couple of reports here, good context. I wanted to in particular mention. I think you guys are so thoughtful about the visualizations that you put into the report.

I appreciate that, I think they are great, they are super intuitive, and I always get good ideas from looking at the way you guys visualize the information. Just feedback, and you requested it during your presentation. I like the notable events or your kind of like headline parts of the report. It's great.

You know I think we all think of different things that happen locally, but it's nice to get that kind of, you know the headlines from the group of experts, like what you saw as being particularly important. I like that. I hope you keep that. Then the final comment I'll make is, there is a risk policy initiative going on at the New England Council right now, and the Commission has also been working on one for a couple of years.

I see these reports as being super critical to those, and so the one that we're looking at for the New England Council, which is still in development, it has a lot of similarities to what we're looking at, at the Commission as well. It has these kinds of categories in it that we'll need at some point, indicators to kind of put the information in there, to know if we're in a good spot or a bad spot, or what have you. I just wanted to flag that for you and your group.

I'm guessing at some point we're going to need to connect in with you all, to start to hone in on kind of a core set of these indices, in particular, I think some of them are intuitive for us. But the socioeconomic indicators, and so far, both of the risks policies have that type of information in them. That's just a flag for you. You know I would love to; we would love to I'm guessing, connect with you all to knock heads on that a little bit at some point.

I offer that, because I think I always really enjoy these reports. I think they provide awesome context, but I also always try and think about ways we can operationalize some of this stuff, and these risk policies I think, are a place that we can really operationalize directly some of this information. Sorry, that was probably longer than you wanted, Mr. Chair, but I appreciate the time.

CHAIR CIMINO: Other hands? Loren, go ahead.

MR. LOREN W. LUSTIG: Thanks to our speaker for a fascinating report. Early on in the report, under the section relating to recreational opportunities, I took note of two terms, effort, and as a lifelong angler, I certainly understand effort. But the second term, effort diversity, I would like to have a little bit of clarity about that. For example, does that relate to the angler seeking different species, or focusing on different habitat areas, for example inshore or offshore, or even the amount of time spent on the water? A clarification would be helpful. Thank you.

DR. GAICHAS: Yes, absolutely, and sorry I could have shown those indicators, but I selected the landings one instead. The effort diversity is actually, it's broader than what you are describing. It is intended to get a picture like across a really big area. The effort diversity is more by just sector, so it is asking, basically, what proportion of the recreational effort is from shore-based angling from party charter or from headboats.

Yes, I think it's really just three sectors, and I apologize, because this is not my area of expertise. But the diversity is looking at the composition of the full recreational effort across those sectors. What we're seeing is decline, basically in the party/charter component of recreational fishing, and a shift more toward shore-based angling.

What that suggests in the report is that the overall number of recreational opportunities has been increasing, but the sort of different options to participate in the recreational fishery are changing, and possibly reduced because of this reduction in the party charter pool. I hope that helped.

CHAIR CIMINO: Yes, Loren is nodding his head. It does for me as well, and I know that I can only speak for what we've been requesting in the Mid-Atlantic, and part of that, Loren is, you know to understand opportunities and what is changing and what we need to focus on. I believe I saw Lynn's hand. Go ahead, Lynn.

MS. LYNN FEGLEY: Thank you, Dr. Gaichas for this awesome presentation. I really appreciate you and your team and your ability, your really big thinking and in your ability to fill it into something like this. I have some questions or a question, sort of a little bit of feedback. About the Chesapeake Bay and I know that we're starting to get some information about the Bay to you through the Chesapeake Bay, the NOAA Chesapeake Bay Office.

But I wonder if there is a way to tackle places where the Bay is really linked to some of these ocean indicators that we were looking at. I was checking out a figure, 55 in particular, which shows the path of that bolstering in October, which is about the time when we'd have other baby Callinectes out there, the little blue crabs. We're suffering from low blue crab recruitment in the Chesapeake right now.

There are some of these real key Bay species, and obviously coastal species like striped bass, that are they are linked from the ocean conditions to big conditions. I don't know, I mean that is really hard stuff to get at. But I throw it out there, wondering if you guys can do that. With your big thinking that is just awesome, so thank you.

DR. GAICHAS: Thank you for the excellent suggestion. We do get really good stuff from the NOAA Chesapeake Bay office each year, as a contribution to the report. That's how we knew the hypoxia was lower than average this year. But I think that's a really excellent point, because I think right now, you know we've got all our data in the coastal ocean.

They've got all their data in the Bay, and we've been putting them in the same report, but have not been able to spend much effort into synthesizing connections. I really like that suggestion, and let me talk to the folks there who are contributing, and see if there is some way we can start to work on that. My guess is we won't have a great answer for you in next years report, but if we work towards it, I think we can start to get there. I think we would all really like to see the estuarine coastal ocean connectivity a bit more. Thank you very much for that comment.

CHAIR CIMINO: Any other hands, comment. John Clark.

MR. JOHN CLARK: Thank you for the fascinating report, Dr. Gaichas. I was just curious about a couple of the trends you mentioned there. The ocean hypoxia, is that something that has periodically occurred over the years, or is it something that is increasing? Then with the Gulf Stream shift, is that something that seems to be a more permanent feature, or is that something that moves back and forth over time?

DR. GAICHAS: Yes, thank you for the questions. I'll do my best to answer them. I'm not a physical oceanographer, but my understanding is that the hypoxia that we observed in the coastal ocean is uncommon. You can get hypoxia in Bays and enclosed waters, because you know they are enclosed, and the water can kind of sit there and the oxygen is depleted if there are too many nutrients. But the coastal ocean is much more open.

It's unusual to see this type of thing happen in the ocean, and it's kind of a confluence of like temperature, and also the local oceanography may be trapping water where it would normally be kind of ventilated more. My understanding is this is rare, but we don't know if we're going to keep seeing it. Luckily, Rutgers has these different gliders out there measuring it in real time, so we are definitely going to keep an eye on that, and try to understand whether something has changed and we can expect to see this more.

In terms of the Gulf Stream, again I'm not a physical oceanographer, but people were really, I don't know how to put it into words. The oceanographers were very kind of excited about 2023, because of how different it was. The Gulf Stream was doing things that they hadn't really seen before, and so they are also trying to understand if this is a new pattern that we're locked into, or if it's just being variable.

My understanding is the Gulf Stream has gotten more variable over time, so it's got more of these meanders, and it can make more of these warm core rings, which is the plot you are seeing in the top right here. There was kind of a shift from having maybe 20 rings per year to having something more like 35 rings per year.

Right around 2000 that was noted, but then recently again this year, it kind of dropped back down into the 20 range. But the Gulf Stream was acting very differently. I think we still don't understand if this type of behavior from the Gulf Stream is to be expected more in the future, or if this was just a one-off thing in 2023.

But it is definitely something we're keeping an eye on, because the Gulf Stream is extremely influential, as you know, on what is going on in the coastal ocean here. We're seeing the oceanographers just keep using the word crazy for this, and I trust them, so I wish I had a better answer for you, but that is why we put this out there. We want to kind of keep an eye on it. Thanks.

CHAIR CIMINO: I'll just follow up, John, as far as monitoring off the coast of New Jersey, and the DEP, I 'm proud to say, has been doing that for quite a few years. DEP and the Board of Public Utilities in New Jersey, have required through the offshore wind solicitations, money to go into research and monitoring. Not only will we be continuing the work that we've done with the gliders, but we're going to be adding to that in several areas. Any other hands?

Okay, Sarah, I'll take a minute, and I apologize if I should know this. You know at the Councils we ask a lot of these reports. But is there kind of like at the end of a peer review. Is there a research recommendation? Are there things that we have listed out as priorities that we also have wanted to look at, but we just don't have the data, and so there is something available to say, you know if the funding is ever available that we would kind of dive into that.

DR. GAICHAS: Yes, I think what we do is kind of gather comments from all of our management partners, and we produce a list. I think I sent you all that, it's called the request memo. Currently it has the requests from the Mid-Atlantic and New England Councils. If ASMFC would like to add to that, like obviously we can't get to all of it right now, and we are trying to prioritize that.

We've worked through that with the Mid-Atlantic Council, and this year we would really like to work through it with both Councils, but there are probably common things that are useful to all the managers in there. I would love to have the Commission as part of that as well. I think you can send us written comments, you can just send us an e-mail.

Yes, we keep that list so that we know what the highest priorities are, so that we don't just always do the easy thing, and we're actually working towards doing the harder things that take a little bit of time. We do use that when we can get extra money or extra funding to put somebody on specific indicators or projects. Is that what you were getting at? We would be happy to have more comments from the Commission.

CHAIR CIMINO: Yes, thanks. No, I guess what I'm getting at is I should have known. Toni also has a comment, so I'll let her go.

MS. KERNS: Thanks so much, Sarah, for presenting. I really enjoy these reports, and it usually takes me a couple times to absorb it all. Sarah presented this report to the Core Team, which is the team that works on the East Coast Climate Change Scenario Planning Group, and the five management bodies will set priorities each year for all of the Councils, the Commission and NOAA, to think about what of the draft action plan items that we want to tackle.

We use this report as one of our items to try to figure out what is needed to be updated or changed in that draft Action Plan. One of the things that we talked about is trying to help get additional funding for Sarah's group, so that they could include more state water bodies. We are lucky that we got the Chesapeake Bay information, because of that NOAA Chesapeake Bay Office, and provide it to them.

From what I understand from Sarah, it's not that they don't want to include that data, but they just don't have the staff resources to bring that additional data in, and then synthesize that you got it into these reports. That is one of the priorities that the Core Team did put in there, to have those additional resources, so that these reports can have some additional information for the states to help us better understand how our state water bodies interact with these ecosystems.

CHAIR CIMINO: Any other hands on this? I'm not seeing any, you said there is one online? Okay, I'm going to turn to the public then, we have one online. Mr. Fletcher, go ahead.

MR. FLETCHER: James Fletcher, United National Fishermen's Association. I have a question. If I made the same presentation and laid it all to nano and microplastics and plastics, none of the other things that you mentioned, just nano plastics, micro plastics and plastics and manmade other chemicals.

Couldn't I make the same presentation and lay it all to the introduction of plastics, and the plastics in the Chesapeake Bay, and the plastics on the bottom where the scallops are? Isn't this program totally missing the effects of plastics; micro, nano and even smaller? My question is, why did nothing in this report mention plastics? Thank you for your time.

DR. GAICHAS: Thank you. I appreciate that, and I agree. We don't have a lot of information on that, and I think it is sort of a missing piece for us is pollution in the offshore environment. I think if we could get the additional resources, I think that is something that we could look into, for the scallop die off in particular.

I know that the Research Track Working Group is looking at multiple things, not just temperature. They are looking at things like disease, and so I think contaminants are not off the table there at all. I just don't know what information they might have. But I would say that we're not ignoring git, we just don't have great data on it.

CHAIR CIMINO: We don't have any other hands online, but I will ask if there are any members of the public in the room that have any feedback for Dr. Gaichas. Not seeing any, Sarah, I think you're off the hook. Once again, really appreciate you taking the time to do this, presenting this to the Commission. I hope that our Board members will continue to use this as a tool.

DR. GAICHAS: Great, thank you, I'll stop sharing now and hopefully I won't break anything.

MS. KERNS: Thanks, Sarah.

CHAIR CIMINO: Commission members should be familiar with the industry-based survey discussions that have come up recently, and the importance of them.

NORTHEAST TRAWL ADVISORY PANEL PROGRESS REPORT FOR INDUSTRY- BASE SURVEY PILOT PROGRAM

CHAIR CIMINO: Our next presentation, next agenda item is the Northeast Trawl Advisory Program Progress Report on the Industry-Base, they like to call it IBS for some odd reason, Survey by that program. I like to call it moderate to severe industry-base survey program, sorry Dan.

MR. DANIEL J. SALERNO: That's quite all right. Yes, I've heard that joke a number of times already, so definitely understand where you're going on that one. For those that don't know me; my name is Dan Salerno. I'm a New England Fishery Management Council member from New Hampshire. I'm also the Northeast Trawl Advisory Panel Co-Chair for the New England Management Council. I also wanted to make sure you understand that this report that I'm presenting to you guys has already been presenting to the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council. This report has been put together by not only myself, but also the Co-Chair from the Mid-Atlantic, which is Wes Townsend, who is also the Chair of the Council, and also Dr. Kathryn Ford, who is our Northeast Fisheries Science Center lead.

Although she's not mentioned on here, we couldn't have put this presentation without our Mid-Atlantic staffer, Hannah Hart. I'll just jump right into it. Just to kind of give a sense of where we're at, the industry-based survey, is actually part of a larger contingency plan. We have put together the Bigelow Contingency Plan.

This was put together, because we've known in the recent past that the Bigelow in itself, the performance has been not as good as they should be, and even when you take out the consideration of the COVID years, you know survey performance and tow completion has been a little suspect in the past couple years.

There was a request to develop a contingency plan, basically when the Bigelow is not available on short notice. This doesn't take into account when the Bigelow is going to be going off the line for its midlife repair in a couple years. We already know that if that is the case that the Pisces, which is a sister ship, will be taking over.

But this larger Bigelow contingency plan is when the vessel just can't get out of the shipyard on a timely basis. Just to kind of give a where we're at with some of those other pieces of the pie. Obviously, the Bigelow contingency plan has, our number one idea is looking at the Pisces. You know as the sister ship, their readiness plan has been drafted, and is being refined through the National Marine Fisheries Service and the Office of Marine and Aviation Operations.

The Pisces is primarily the Southeast Fisheries Science Center's vessel survey vessel, and it will become the primary backup for the Bigelow, in case there are issues with the Bigelow. Obviously, there are some concerns here, when we're looking at, well when do you trigger that the Bigelow is not going to be available? How do we get the Pisces here?

Is the Pisces ready? Is there funding? Is a specific plan in place to have the Pisces kind of sitting and waiting? There are also concerns with this from the NTAP, particularly from the industry members is that the Agency feels that getting the vessel from Mississippi to New England shouldn't be a problem, you know we could probably get it here in a week's time.

Where some of us more feel that this is probably more of a two-to-three-week time period of getting that vessel up in here into the New England region, and actually conducting the survey tows as needed. Another option in the contingency plan is, you know looking at the Northeast Fishery Science Center, is having another vessel calibrated to the Bigelow.

This proposal actually is on the table. It is in the hands of the Science Center's Director, Dr. Jon Hare, and is being discussed at Headquarters. There is kind of an optimistic timeframe that this will only take about a year to a year and a half to acquire a vessel. This is actually a real-world concern, because as some of you know, that this is where the Gloria Michelle comes in, it is the vessel that conducts the, well it used to conduct the Shrimp Survey, it also is the Massachusetts State Survey. This vessel is actually, it's ending its end of life, so there is this concern that there will be a new vessel coming online to fill in where the Gloria Michelle used to.

Part 3 of the plan is looking for an industry vessel that is calibrated to the Bigelow. While there is no progress on that, but there are some commercial vessels in probably the New Jersey, Mid-Atlantic

region that may be able to fit this bill. But like I said, we haven't really made any movement on that as the contingency plan has been moving forward.

What we're really here for is an update of the IBS Survey, the Industry-Based Survey. This is going to be a separate survey that is not calibrated to the Bigelow, so in essence the theory is that this would be a whole new time series moving forward.

Just to give an idea of how we got here. As we all know that in September between the Commission and the two Councils have requested from the Science Center a white paper on what it would take to do, outlining what an industry-based survey would look like, and that was presented to all of us in the January/February time period.

There was a follow-on request from the Science Center to further develop, put some more meat on the bones of actually developing a pilot survey, because the feeling was, yes, we have a white paper, but we wanted to take it to the next step to make sure that this is something we wanted to move forward on.

There seems to be a lot of momentum behind everyone that between the Commission and the Council and the industry, did the Science Center really feel that this was probably something we do want to move forward with. Where we're at right now is, there has been some movement of how we're putting together of what a pilot would look like.

We did have some early discussions at the full NTAP Panel meeting in early February in Virginia. But we also had a more dedicated working group to really answer, start drilling down, what are some of the things that we would really like to see in an industry-based survey, and what can we look at in a pilot survey?

One of the main objectives that we kind of felt was important is, this industry-based survey should be able to work in wind farms. Obviously, we all know that wind energy areas are popping up, theoretically up and down the coast. We're really looking at, can this industry-based survey, through the pilot. Can we determine, can we do this survey work within wind energy farms.

We feel that this is a possibility or probability, because as we know some of these areas that are already up and running, being developed in the southern New England region, do have vessel-specific monitoring, industry monitoring vessels in there. But keep in mind that those have different objectives, as opposed to what our industry-based pilot survey would be doing. Our focus is on looking at what we would need for stock assessment needs, you know so looking at indexes of abundance. Our plan was to use the same strata as what the Northeast Fisheries Science Center does for the Bigelow. Currently the stratification for the Bigelow is under review, and vetted changes come out of that, that would be applied to what we would do in this industry-based survey under the pilot. We feel that the focus of the industry-based survey, as we mentioned is for stock assessment needs.

This is not a full-blown ecosystem type of survey. We would be looking to truncate our depth strata to probably the 130 to 150 fathom max range, instead of going out to the 200 plus. It would really be an analysis of what is the bang for the buck? Where are we getting what we need for stock assessments, and kind of cutting it off, you know where we start losing that dataset that really doesn't add to the stock assessment needs.

Our survey focus, we are looking at multiple ages, it's not going to be just one specific area, so we are interested in looking in the Gulf of Maine area, the Georges Bank, the Southern New England and the Mid-Atlantic. Under the pilot survey we're looking to see what we can do between a five-to-ten-day window in each area, but not necessarily at the same time.

The reason why we're looking at maybe doing it in different timeframes, because this is probably even under a pilot, this is kind of a resource intensive, between equipment, humans, vessels. We're kind of looking to how we can do this on a cost savings approach as well. There has been discussion of what

type of vessels, how much survey, is it going to be daytime, 24 hours?

What we've settled on is looking at similar size paired vessels operating on a 12 hour per day basis over the 24 hours. To answer the question of, well day tows versus night tows. We figured we would split it up more along the noon to midnight, and the midnight to noon. For full effect those would be both surveying, the pairs would be surveying both nighttime and the daytime, to hopefully get away from some of the concerns of the bias of the day and night fishing.

The survey gear approach, we agreed on that we're going to use the same trawl gear that is used on the Bigelow, that is the 400 by 12 four seam net. But we're not going to use the same doors that are on the Bigelow. How we plan to approach the door question is using the Rhule rope or the restrictor rope that has gone through some study recently on the Darana R.

Basically, we're going to use that. It's a rope that is using to connect the two doors to kind of standardize the spread over multiple depths, and it also helps to standardize the gear across multiple platforms as well. It kind of gets to, well we know the gear should be doing the same thing regardless of who is towing it and where they are towing it.

One of the other things that we discuss is that we don't feel an otter trawl system is necessary. The otter trawl system, for those that don't know. This is what is used on the Bigelow to constantly ping and bringing in and putting out wire, to make sure that it's based on tension, to theoretically keep the gear in line.

But we feel that this is probably overkill, and this is also something that would potentially add to the cost of our pilot, and overall if we did move forward with an IBS Survey. What we're looking to collect. Under this pilot program we're trying to see what we can collect; how much we can collect. This not only includes the biological data, but we're going to be collecting net mensuration gear. All the electronics that are on the vessels, you know also looking at CTD tasks, plankton and the acoustic data. We're trying to get an understanding of what we're going to collect. But one of the things that we're also looking at is trying to use what is available, so what is on the vessels currently. You know if we would use their net mensuration gear, or whatever electronics they have on the vessel.

Some of the other objectives we're looking to under the pilot right now is we want to meet with other scientific survey crews in the region. Obviously, specifically we're referring to the VIMS NEAMAP Survey folks, the Science Center folks, also the Maine/New Hampshire Trawl folks, also the Massachusetts, to get an understanding of the sampling stations that are needed.

Obviously, we would want to have some kind of portable system that could move from vessel to vessel, and these things have already been developed across other platforms, so what does it take? Where could we save some time and energy and money in looking at what has already been created?

We're also looking to develop some workshops with those interested vessel captains/owners that would be interested in participating in the pilot survey, just to give them an understanding of what the expectations are, what would they be doing for us, and what we could be doing for them, to help them get this moving forward.

Those are the things that we've worked through already, and I think we have a good handle on. If we move to the next slide, this is where we're still lacking on what we need to kind of work through. These are the elements that we still need to kind of think about, and I think we'll probably be looking at this over the next couple months, between now and probably summertime, when NTAP has another full membership member leading.

One of the key questions is, who is going to manage the pilot, you know as we develop it and go through an implementation process? Will this be directly with the Science Center? Will there be a third party that is going to be brought onboard to do the pilot?

This is also kind of thinking not only just the pilot itself, but if we moved into a larger scale, you know there are resources that we need. Even if it's a third-party entity, we need to include that.

There still will be resources needed from the Science Center. We need to get a better handle on the management of the project. As I mentioned, these work sampling stations, we need to get an understanding of what is required for space, and also the electrical requirements. Keep in mind we're doing data collection.

Electronic data collection nowadays, you're talking about computers, not only on deck, for the link for the input of the tablets and what have you, but we're also having servers onboard on the vessel as well, so there are obviously some additional electrical requirements that go beyond what a normal commercial operation would need.

There is also the data management implication. You know we're going to be collecting a whole host of data. We'll be using multiple net mensuration gear, also multiple electronic type equipment. Will we be collecting that in the same format, same frequency? There is that question. Will we be able to kind of collate all that data across multiple platforms? Also, we're looking at what we need to kind of think through is, what is the biological sampling and how much data we're going to collect. We're looking at the industry-based survey, hopefully we'll understand what is the volume, and who is going to process all this stuff? Who is also going to do the data analysis?

Those are some of the questions that we're still thinking about data wise. There are certain parts of the survey, the pilot survey, that would probably be more of on the water type review and refinement, specifically talking the scope of the water. How far behind the boat is the gear going to be depending on depth?

Also, the tow speed and tow duration. You know that when the Northeast Fisheries Science Center went from the Albatross to the Bigelow, again some changes in those components. It's kind of understanding of where we would like to see this industry-based survey looking at a time duration component, to get an understanding of, are we collecting enough without going overboard.

Obviously, the cost is a big deal. We've had some back of the calculation calculations of what we feel that this will cost, and a rather conservative estimate, we came up with is 1 to 2 million. I know there have been some people looking around that are actually probably looking for more in the range of 3 million dollars, just to get this pilot survey up.

I think it's a good estimate, because we want to have a good robust pilot to inform, if we went further on in industry-based survey. Also, some of the other discussion points that we need to work through is the statistical design of what this industry-based survey would look like under the pilot. You know, do we want to capture some of those shallower depth ranges that were lost when the Bigelow came on?

The timing of the survey, obviously the highlight here is because, you know we talk about wind energy areas as one of the big elephants in the room when we talk about loss of survey strata. But other, as we saw in the last presentation. You know we're seeing climate change effects. Do we want to focus this survey to kind of focus on, do we want to address how climate change has affected the catches in our current surveys?

Do we want to look at maybe doing a survey at a different time period versus what is being conducted by the Northeast Fisheries Science Center? Also, we're thinking about, do we want to overlap with some of the other NEAMAP surveys? How far inshore do we want to cover into some of those state water strata? We also need to think about the design in itself when we're talking about the adaptability for the future loss of survey areas. Obviously, it is a Southern New England, Mid-Atlantic region.

What we're seeing now is a lot of these fixed-station wind energy areas. There is potential for these offshore aquaculture operations that we're going to lose, that we may or may not be to tow in and

around. But keep in mind in the Gulf of Maine, and even in the Southern New England/Mid-Atlantic regions, some of these further offshore areas, we're going to have floating ones, which is a whole different concern of how mobile gear type surveys will be able to operate in that. That is basically a lot, those are the things that we're still trying to work through. I think we have some good ideas. We have a very good panel. Hopefully we can get through that. We've gotten some really good feedback from the New England Council, the Mid-Atlantic Council, of how we can kind of proceed. But that is where we are right now. That is all I've got for you guys, open to any questions, concerns, comments and I'll definitely bring it back to the larger group as we move forward on the IBS Survey. Thank you.

CHAIR CIMINO: Thank you, Dan. I'll look around the room. I don't think it could be stressed enough how important it is to get this going. We appreciate the progress report, but there is still quite a bit left unanswered. I'm going to go to Pat Keliher first.

MR. KELIHER: Dan, thanks for that report, it was excellent, and a lot of really good background. One of your last slides you gave a cost for the industry-based survey for this pilot of 1 to 2 million dollars. ASMFC has highlighted within our appropriations priority the need for 3 million. I'm wondering what the disconnect there. Is it because we have potentially data analysis and processing built into our numbers that is not in that number? I just want to make sure that the numbers that we're using line up with what the need is as we're talking to Congress.

MR. SALERNO: I appreciate the question, Pat. I think you've hit on it pretty well; you know. I think when we were looking at the 1 to 2 million, we were thinking of hardware, software, you know the physical. But as you mentioned, we didn't think beyond of who is going to do this data? Who is going to do the management? Who is going to do the processing? I think you are in the ballpark there of closer to the 3 million, when you consider the overall, every component of the project.

CHAIR CIMINO: Other questions or comments? John Clark.

MR. CLARK: Yes, I'm just curious, Dan. Do you have any idea how many industry vessels would A. be eligible to do this work that are the right size and all that, and B. would have interest in doing this?

MR SALERNO: I can answer A, a lot easier than I can the B. We're trying to design the survey around being cost conscious, but also making sure we can have a larger pool than participants. Some of the things we thought about not having an otter trawl. I mean there are very few vessels in our region that have that, so by not having that, that opens up the pool of candidates.

By not going out to the 200-fathom depth, that also opens up a larger pool of candidates that could participate in this. We're probably thinking vessels in the 70-to-90-foot range, which as you know that is a pretty fair number of vessels in that range. Anything larger, you know if you were talking about the 24-hour sampling.

This kind of gets to our Part 3 of the Bigelow contingency plan. When you're trying to replace the Bigelow with something that could do what the Bigelow does, you're really shrinking that pool down. We're trying to make sure that we're having a program, a project that is getting what we need but that could be open to more people. I would turn to Chairman Reid, who has his ear to the ground more with the industry of who would be interested. But I would think that there would be definitely folks interested in participating in this, because as we know, we always hear that the industry is like, we want to help you with your survey methods, where can we get online and work through with this problem with you. I think there will be interest. We just don't know who the candidates are yet that would be interested.

CHIAR CIMINO: Thanks, Dan, for that answer. I believe Chairman Reid had his hand up, so Erick, if you want to go ahead.

MR. ERIC REID: Thanks for the question, Mr. Clark. You know we are not replacing the Bigelow with an industry vessel, because of what Dan said. There are maybe one or two vessels that are capable of that.

But in order to do it with industry vessels and accomplish the tasks. You know one of the reasons we went to the 12-hour day, noon to midnight, midnight to noon, was crew size. The horse power and the tow capabilities of a lot of boats are reasonably the same.

But when you're talking about a science crew of 15, 17, something like that people for a 24-hour day operation, nobody can carry that many people, or very few boats can carry that many people. That is why we went to the two-boat system, where you have room for the crew, you know four guys or five guys, and a room for a science group through four or five guys as well. That brings a lot more vessels into the pool of possible candidates. The other thing is, the use of the Rhule rope.

That stabilizes the gear regardless of the vessel effect, or reasonably without the vessel effect. You're only towing one mile at 3 knots, so the horsepower capability of those boats can cover a very, very wide range. There are a lot of reasons for the way we did things, mostly to get the data we need. But to get the industry one, to participate, and two, to buy-in, which they're all buying in already. I think we'll have plenty of willing participants.

CHAIR CIMINO: Thank you, Eric, any other questions or comment? Go ahead, Kris.

MR. KRIS KUHN: Yes, Dan, more of a clarification question. You said the intention, I guess the stated intention was that the continuation for the IBS would be essentially starting a new survey, so a continuation of the datasets. I'm thinking of the way we use stuff for stock assessments, and use the historical data going back in the Albatross/Bigelow combined, that we wouldn't really be able to get the continuation in the datasets for a lot of species that we currently use with the groundfish survey.

MR. SALERNO: Yes, because this is a new dataset, I mean and that is the approach that we're taking. This will be a new dataset, so using indexes of abundances, obviously we would take, you need a number of years before we could start using that. But I think there are other data components. You know some of the environmental data collection, or even some of the biological weight at age or maturity. That type of information could start feeding into the stock assessment sooner. But yes, anytime a new survey starts, we understand that it is going to take a while before at least the index of abundance type information can be used in a stock assessment process.

CHAIR CIMINO: All right, Dan, thanks again. We don't see any hands here, so I think that is going to wrap it for now, and we will appreciate continued updates on this.

MR. SALERNO: Okay, thank you.

CONSIDER REVISED GUIDELINES FOR RESOURCE MANAGERS ON THE ENFORCEABILITY OF FISHERY MANAGEMENT MEASURES

CHAIR CIMINO: Our next agenda item is Consider Revised Guidelines for Resource Managers on the Enforceability of Fishery Management Measures. For those newer Commissioners and those of us that are somewhat forgetful. Kurt Blanchard has promised that he'll give a little background on this. Without any other introduction, I'll turn it over to Kurt. Thanks.

MR. KURT BLANCHARD: Over the past year the Law Enforcement Committee has conducted a review of the guidelines for resource managers on the enforceability of fishery management measures. The Law Enforcement first prepared guidelines for resource managers on the enforceability of fisheries management measures for guidelines back in 2000.

In keeping with ASMFC direction, periodically review and update the guidelines, the LEC revised this document tin 2002, 2007, 2009, 2015, and now the Sixth addition in 2024. The LEC strongly encourages managers to consider the enforceability of all management regulations that are developed.

We believe the guidelines to support and strengthen the effectiveness of the Commission's efforts to conserve our marine fisheries resources. Compliance in natural resource regulations help to ensure

sustainable fisheries. Many factors contribute toward compliance, including but not limited to perceived legitimacy of the regulations and/or process, moral norms, voluntary compliance, enforcement and enforceability.

The guidelines were organized into five sections for ease of reference. Section 1 is the general enforcement operations. Section 2, enforcement tools, it's a new section. Section 3, general enforcement precepts, Section 4, enforceability ratings, and Section 5, the enforcement strategies and recommendations.

Under Section 1, this section provides a statement on the general enforcement operations that should be considered when implementing new management options or strategies. Available enforcement resources are maximized by enacting regulations that can be enforced at more than one point during fishing activity.

Law enforcement relies on state and federal partnerships for at-sea patrol inspection efforts. Officers work with these partners to provide effective at-sea enforcement of state and federal regulations, particularly those involving area, gear and prohibited species restrictions. Section 2, as we stated is a new section.

Enforcement tools are management measures that are not specifically designed to limit catch or effort, but to aid in the enforcement of other management measures that do so. Enforcement tools such as electronic reporting, prelanding notifications, and VMS have improved the effectiveness of certain regulations, by allowing enforcement staff to focus effort on high priority areas. These tools do not replace traditional enforcement, but rather complement patrol work and inspections. Requirement for some of these tools should be considered essential for affective enforcement of some management measures, for example, VMS for closed areas. Newer emerging technology such as cameras, ropeless fishing and others should continue to be explored. Section 3 are the general enforcement precepts.

These are kind of the backbone of the thinking of law enforcement in regulatory development. Simplicity, the most enforceable regulations are those that are simple, realistic, easy to understand, and presented in a acceptable way to the regulated community. Consistency, regulations should make every effort to minimize exceptions and exemptions.

Wherever possible, managers should adopt the same management measures among different fisheries management plans, across different state boundaries, and between state and federal waters. Stability, regulations should avoid frequent changes. When this occurs, there must be concerted outreach and educational effort to adequately inform the public.

Effectiveness, in general the most effective regulations for an enforceability perspective, are those based on controlling effort, closed areas and/or seasons and not the outputs, catch quota and/or trip limits. Most importantly, safety. Regulations should be designed so they do not create an unintended safety-at-sea issue.

Section 4 talks about the enforceability ratings. The 2024 Guidelines included a survey of 20 voting members of the LEC, who numerically rated the enforceability of 27 management measures based on three categories; dockside, at-sea and airborne. The enforceability of each management measure was rated on a scale of 1 to 5, 1 being the last enforceable, 5 being the most enforceable.

For each of the three categories, an average at-sea and dockside rating from the survey is also presented. It is important to note the survey indicated limited applicability for airborne resources in the enforcement of most management measures. Therefore, the airborne value was only included in the average ratings when it increased the average value of the management measures.

If the airborne rating increased the average rating, the inclusive average is indicated in parentheses. The results of the updated survey are presented below in a visual matrix. Management measures are arranged in descending order of their average ratings from the

survey. Responses receiving a score of greater than or equal to four are color coded in green.

Those with an average score greater than or equal to 3, but less than 4, are color coded in yellow, and those with less than 3 are color coded on red. Basically; green, slow down, stop. What you see before you now is the matrix. It's just for a quick reference snap shot on where Law Enforcement stands on different management measure.

As you kind of digest this a little bit, you'll see in the upper portion of the document, permits, slot limits, prohibited species, bag possession limit, low volume, minimum and maximum size limits, closed seasons and our latest or newest management measure that was added to this document is a tagging, labeling, marking of species. You'll see where those are basically 4.00 or higher, all in green, good to go. As you work down the document, you pick up on closed areas and gear restricted areas. Those have the dual values where the airborne applicability was added to it. You can see where the average of just dockside and at-sea fell for closed areas, for example at 3.26, with the added emphasis of the airborne, it rose to 3.58. Again, important to note on this document, as you go to the bottom of the document, where we get into the red zone.

Consistently over the last several editions of this document, and it continues to be, tagging prohibitions, limited drag and soak time always fall at the bottom. ITQs, IFQs, Limited Access programs, those still fall low, but I think that is based on the complexity of those types of programs. Section 5 talks about the enforcement strategies and recommendations.

This section provides information about each of the management measures that were considered in the Guidelines. Included is a brief definition of the measure, it's numerical ranking based on the survey results, and some thoughts for consideration when drafting regulations. For ease of organization, the management measures were listed alphabetically.

In 2009 the LEC evaluated 19 management measures, in 2015, 26 management measures. In 2015, 26 management measures, and now in 2024, 27 management measures. The tagging, labeling, marking of marine species. This was the added management measure for 2024. This slide to show you two pieces, one to talk about this new management measure, but also to show you the makeup of what each management measure is provided for within the document.

We defined what the management measure is. In this particular instance, the act of placing an approved manufactured tab, label or a manipulation/alteration of your perspective marine species, for the purpose of marking a marine species for management purpose. They include the overall rating of it, in this particular case, 4.00 in the green zone, you're good to go.

Recommendations that should be considered when adopting a regulation. Tags should be in an approved device that is identifiable, traceable and tamper proof. The tags should be placed in a marine species in a location that will cause least harm to the species, whether alive or dead. When any alteration to a marine species, (i.e., fin clipping, v-notching or other.) The requirement should be consistent among all jurisdictions.

Improved documentation in the labeling of fish and fish products, would enable the law enforcement to track such products back to the harvester and the initial purchaser, and to intercept unlawful seafood products at various points between harvest and final sale for consumption.

The LEC gratefully acknowledges some of our current and past members, who contribute time and expertise to the guidelines. We thank NOAA Fisheries Office of Law Enforcement, NOAA General Counsel, U.S. Coast Guard, Districts 1 and 7. This group being the authors of the enforceability precepts for the Northeast Regional Fisheries Management Councils, dated June, 2013.

For them sharing their publication with us, and allowing us to incorporate selected material from this document. I would like to thank the staff here, Toni Kerns, Tina Berger, Madeline Musante, for their

assistance in updating the document. We also acknowledge the opportunity afforded to our Committee by the Commissioners and staff at ASMFC to revise the guidelines, to make them available for routine use and reference. I'm available for any questions and I believe we need to ask for approval of this document.

CHAIR CIMINO: Toni says, correct. Let's start with any questions or comments. I'll look around the table. John Clark.

MR. CLARK: Yes, thank you for the presentation, Kurt. I was just curious. One complaint we hear often is individually marked gear, like in this case crab pots. I know from the enforcement side, counting them is very difficult, and yet there is a lot of concern that some might have too many out there. Has the LEC looked into something like drones and cameras on that for counting? Because I know how difficult that has got to be if somebody is allowed to have 300, 500 pots out there, to try to count everything.

MR. BLANCHARD: It's difficult to count fixed gear for trap and trap limits, based on a visual aerial type observation. We can detect where the gear is, but ultimately, you're not going to get a final count unless you're hauling that gear. To have those resources to do that, many states do have the resource to haul gear.

There are a lot of concerns in hauling of gear, liability concerns, things like that. Airborne, the interesting on airborne is only about 60 percent of the agencies have some type of airborne capability. We broke that out between traditional aircraft, drones, who has both, and who may not have any.

Basically, 36 percent of the Agencies had 0 use of aircraft. The other ones that did have, whether you're using drones, for example, are still working through some of the policy issues and all of that type of privacy concerns with drone use. Traditional aircraft, you're typically pretty good to go. But that is usually a shared resource, maybe from our federal partners, to a state partner or from a state-to-state partner.

CHAIR CIMINO: Other hands, Roy and then Craig.

MR. ROY W. MILLER: Thank you for the excellent report and the excellent visual. I noticed in that visual you used at the very end of your talk, where it ranked the various techniques. I couldn't help but notice that targeting prohibitions were ranked at the very bottom of that scale in the red zone, and yet we spent a great deal of time at yesterday's meeting and prior meetings, talking about targeting proposals, the very same thing that is ranked the lowest. I just wanted to highlight that. Thank you.

CHAIR CIMINO: Craig.

MR. CRAIG PUGH: I want to expand on what John's question was. I will listen, and that is why I'm asking you this, because I don't know what is really enforceable for a judge. If there was a time stamp with latitude and longitude of such gear, would that be admissible, and do you think that would be valid? Say, if you took that with a drone of a time stamp position from me to you, Pat Geer, boing, boing, boing. You take a latitude and longitude, apply that to that. I don't know if there is a certain calibration we have to do, like weight and measure. But wouldn't that be a reliable source in front of a judge, I would think? If I'm going to vote for that I think I would have a concern.

MR. BLANCHARD: Would a drone use some kind of stamp or location stamp on a drone or GPS use on the vessels, or whatever. Respective states and agencies have to prove the reliability of the device recording that. That type of information needs to be produced in prosecuting cases, so it does get a little bit complex on where you're trying to get that.

You could get into a situation, depending on the level of case, whether you might need industry manufacturers to come in and talk about proof of reliability of those devices. You know GPS in general has been more accepted within the courts, but it can rise to that level of complexity of having other experts come in.

CHAIR CIMINO: Jay.

DR. JASON McNAMEE: Nice presentation, Kurt. I also really liked the matrix. I bet that is shocking to you in particular. This is more of a comment, but I really did appreciate this, and I think it could be really useful as a guide, so as we're developing an addendum or an amendment or whatever. You know we are proposing different types of regulations.

We can use this as a guide to sort of flag, we often bounce back to Law Enforcement Committee to sort of have you guys verbalize what you now put together for us. I just offer that thought that we could use this as a guide, and maybe include it in some of the information that we are putting out for the public to see as well.

MS. KERNS: The resource is available on the website, right, so there is that tool. But we could also have staff, when we're pooling tools, remind the Board either in the PDT document, or in the staff presentation to say enforcement, this is a green or a red or a yellow on some enforceability guidelines. As Kurt said, some things have to be in context of what's going on. But the Law Enforcement Rep can also provide that context during the Board's discussion.

DR. McNAMEE: Right, just to follow up. I am in complete agreement. Yes, so however it lifts, we can sort of think about that. But I agree. Then I think it changes from what does enforcement think about this to now kind of digging into. We have this general statement of what enforcement thinks about this, put it in the context of this particular action, and how does it fair? I think it changes the conversation a little bit, makes it better in my head.

MR. BLANCHARD: Also, just to your point, and thank you for those comments. The discussion around the table with the final approval of this from the Law Enforcement Committee was that the representatives that sit at this Board table represent law enforcement, needs to reference this more. As you know, it's been around since 2000, and maybe anecdotally somebody might reference it. But we don't incorporate it typically in our response, and I think that is something we could do better.

CHAIR CIMINO: Pat, you had a comment?

MR. KELIHER: If a motion would be in order, Mr. Chairman, I would be happy to make one.

CHAIR CIMINO: I appreciate that, and I am so sorry to everybody, but I have a question. I know we're kind of behind on time here. We have the information on what is and isn't enforceable. Some of the stuff that really isn't so much, is stuff that is kind of really important to us, right. It's a way to manage. I'm just curious. I'm not going to put you on the spot, in the interest of time, so a yes or no. Has there been discussions around finding a way to do these things, say soak patterns, for example.

At least it's in there, or even targeting. For the most egregious cases, you absolutely know those nets have been there forever, and it's just a mess right now, but you can't pull it, because there is no regulation on it. Has there at least been a discussion on finding a way, that we're not asking you to enforce it at all times for everybody, but that there is something for the most egregious cases.

MR. BLANCHARD: The simple answer to that is, yes, we do consider it. We know that managers and these boards have a job to do and a mission to complete, and we want to support that. We don't discount any one of your management measures, it's just important to know, and we've mentioned on different occasions, like we use limited drag and soak time.

The amount is so manpower intensive to monitor that, because you will have to be there at time of set, you will have to be there at time of pull, things like that. To try to monitor those types of things. In a sense that is why we always talk about it. We talk more about use of technologies, because some of that can help us do our job better. It's an additional enforcement tool. It supports, it supports the management measure that you might be trying to facilitate. We actually now have the means to be more proactive in supporting that.

CHAIR CIMINO: Thank you, and I appreciate all the work that went into this. It was a great report. I'll look to Pat then for a motion. I appreciate that, Pat.

MR. KELIHER: Kurt, I really appreciate this report. It's clear that this is not a status report, you're making changes to this report based on the comfort level within the enforcement community about different things. I was able to witness some of those conversations a couple days ago. Appreciate the word on this, and with that thought I would **move to accept the modified report for usage by management.**

CHAIR CIMINO: Second by John Clark. The first one who had his hand up out of many. I'll read it into the record as written, Pat. The motion here with a second is, move to approve the Revised Guidelines for Resource Managers on the Enforceability of Fishery Management Measures. Any discussion on the motion? Go ahead, Adam.

MR NOWALSKY: No other discussion, just one other question about it. The enforcement element, I was surprised that out of the 27 management measures, prosecute or prosecution was only referred to for a half dozen of them, in the extended part here. At one end of the spectrum that says to me, well, 21 of these have a high percentage of being able to be prosecuted when used. When we bring it before a court the Court says, yes, this is good information. On the other end, I'm concerned that enforcement says we're throwing all these things out here, the courts don't really give a darn. Maybe there wasn't as much focus on the ability to prosecute here, because enforcement has just kind of thrown their hands up on the lack of prosecution that occurs. I'm hoping the answer is closer to my first part, but I would like to know your thoughts on why we didn't hear more about the success level of prosecution with these management measures.

MR. BLANCHARD: Maybe it's unintended in there, but I think the success level of prosecution comes from the values being rated higher. I don't have that right in front of me, as far as which ones had prosecution mentioned in each and every one of them. But I suspect that those were in the lower column, more in the red columns or the low yellows. I think it is implied that they are more enforceable. They are more enforceable. That prosecution element comes into that also. Thank you, Adam.

CHAIR CIMINO: Any further discussion? Not seeing hands. **Any objections to the motion? None, okay. I'll consider that passed by consent.** Once again, thank you, Kurt. Next up, and sorry for the delay. Dr. Katie Drew on the Stock Assessment Updates.

STOCK ASSESSMENT UPDATES

DR. KATIE DREW: I'll make this quick. We have a number of assessments going on right now, but I'm only going to provide an update on two that did not have board meetings this week, the River Herring Benchmark Assessment, we're still finalizing the dates for the peer review, but we plan to have that completed by the end of this month, so that it can be presented at the August meeting. Similarly, the sturgeon assessment update is well in progress, and will be ready for presentation at the August meeting as well. Thank you.

CHAIR CIMINO: Any questions for Katie? No, okay, great. Next item on this agenda is Review of Noncompliance Findings. There aren't any, and the good news there means that there will be no intra-business session after this.

OTHER BUSINESS

CHAIR CIMINO: We have two items for Other Business. I'm going to start with Toni Kerns, and then Pat, I'm going to go to you when we talk eel, and actually even on the other one.

LETTERS FOR CONSIDERATION ON BEHALF OF THE AMERICAN LOBSTER BOARD

MS. KERNS: We have two letters for consideration by the Policy Board on behalf of the Lobster Board, and Pat, I will introduce the first letter for you, and then you can talk about the second letter. The first letter was just a consent letter, so we don't have any physical motion on the Board for you all to read. But it's to send a letter to the New England Fishery Management Council highlighting the keys points of the Technical Committee's report on the conduct of

the lobster fishery on the northern edge of Georges Bank.

The Council is considering management action to open to potential areas to the scallop fishery, so the Lobster Technical Committee was tasked to describe the abundance and makeup of the lobster resource on the Georges Bank, and then potential impacts to the scallop gear for that lobster. The additional piece is that we are going to try, if we can, if we can find the available information to provide some economic data for that fishery that is occurring, and provide that to the Council in the letter as well.

CHAIR CIMINO: Cheri.

MS. CHERI PATTERSON: Would it be possible to add into that, any sort of, I'll just say it's possible, any sort of thought about offshore wind and any sort of displacement of gear that may occur in that area in the future, which would also be a consideration for the northern edge?

MS. KERNS: I think that we could express concerns for potential displacement into those areas, whether or not we would have that data available for us now, or we would express the desire to see if the Council can analyze that type of information in that letter, if that is the pleasure of the Board.

CHAIR CIMINO: Dan, you have a comment?

MR. DANIEL McKIERNAN: I would suggest we add a line to the letter that might say that if the lobster fleet is displaced from the area by the scallopers, you know bear in mind there is going to be additional displacement to the offshore lobster fleet when the offshore wind areas are developed. I think conceptually, I think Cheri is on to something that is a second level of stress on that, attributable to displacement on that fleet.

CHAIR CIMINO: Okay, with that addition, any objection by the Policy Board to moving this letter forward? Seeing none. Toni, do you want to introduce the second letter? Go right to Pat. Go ahead, Pat.

MR. KELIHER: Yesterday, I don't know, did you have that language you were going to put up? Yesterday also on, yesterday, several months ago it seems like now, the Lobster Board met to discuss some of the challenges we have with the gauge increase as it pertains to trade with Canada, and some of the timing issues.

A motion was made, which is up on the board right now that was recommended that it be sent to the Policy Board for consideration and approval. I would say, and I would look to the maker of this motion, that we did include in the full last sentence, the letter would request Canada increase the minimum size for lobsters in the Gulf of Maine.

But the trade issue also pertains to lobsters that would come from the Gulf of St. Lawrence as well, so we may want to just be, I'll look to the maker of the motion, but we may want to just be silent on the Gulf of Maine, and just say the minimum size of lobsters on the same schedule as the Commission.

MR. McKIERNAN: I concur with that.

CHAIR CIMINO: Seeing some other heads nod. Any other comments on the fine tuning of this yet? Let's get it up, let's get the motion corrected before we move forward.

MR. KELIHER: I'm being directed to read this. **On behalf of the American Lobster Management Board, move that the Commission to send a letter to Canada DFO and relevant Canadian industry associations, as identified by the Board Chair and the Executive Director**. **This letter would request that Canada increase the minimum size for lobster on the same schedule as ASMFC, or as soon as possible, as captured in Addendum XXVII.**

CHAIR CIMINO: This is moving forward on behalf of the American Lobster Management Board. I see a hand up, Mike Ruccio, go ahead.

MR. MICHAEL RUCCIO: Not to muddy the waters on this. I think as we've discussed before when we've had issues, where the Lobster Board in particular has discussed communications with Canada and DFO. I

would encourage the Lobster Board, certainly you are well within your rights to do as you please on this, but to engage NOAA and our International Trade Group.

We do have regular bilaterals that occur government to government, so however to loop those in, whether they are part of the letter, you might need to review or signatories, or whether they are just kind of looped in as a courtesy. I strongly encourage that. I think it can help in the overall messaging to have multiple fronts of communication on that. Thanks.

CHAIR CIMINO: Yes, go ahead, Pat.

MR. KELIHER: Yes, I appreciate Mike's comments on that, and I don't disagree at all. I'm not sure we need to capture it in the motion itself, as far as the letter is concerned, but I think from a Policy Board perspective, the record could clearly show that we would agree that we need to engage with NOAA on a continuous basis on this issue, as it relates to trade.

CHAIR CIMINO: Yes, I agree as well, and I think that as we continue to update the Lobster Board on this that we will reiterate that cooperation as well. With that; as I mentioned, you know we have a motion before us that doesn't need a second. Is there any further discussion? I see someone who thought better. Any other discussion on this? Okay, **is there any objection to this? Not seeing any, we'll consider this approved by Policy Board by consent**.

LEC UPDATE

CHAIR CIMINO: We do have one other agenda item, and that is the LEC Update. Kurt.

MR. BLANCHARD: I was thinking we might skip that based on time. I will keep it super-fast. We conducted s hybrid meeting this week with the spring meeting. The Committee welcomed Brian Scott of New Jersey Fish and Wildlife as a new LEC Representative from New Jersey, and Captain Scott Pierce, the Florida Fish and Wildlife Conservation Commission, transitioning to the role of Chair of the LEC.

Lieutenant Delayne Brown from New Hampshire Fish and Game was elected the position of Vice-Chair. We covered some species issues, we had discussions on striped bass, Atlantic cobia, spiny dogfish. I won't jump too far into the details on that, and American lobster. We had a really good presentation on the American lobster piece.

The LEC discussed the status of Addendum XXX of Amendment 3 of the lobster plan, this discussion centered around the Mitchell Provision and how the Addendum will interface with Addendum XXVII. The LEC will continue to follow development of this Addendum, and offer comments as appropriate. Some of our general business issues we discussed. We had a presentation on the North American Wildlife Law Enforcement Accreditation Program from John Cobb and Captain Rob Ham from Virginia Department of Wildlife Resources provided a presentation on new wildlife law enforcement accreditation, being implemented through SEAFWA. Created in 2022, NAWLEA offers a comprehensive accreditation program for wildlife law enforcement agencies.

Their team is composed of experts in the field who are dedicated to ensuring the highest standard of professionalism among member agencies. This is a credentialing program that is recognized by the U.S. Department of Justice. We had a good conversation and a good presentation from representatives of the Maine Marine Patrol and the U.S. Fish and Wildlife Service on the status of the elver fishery.

Information was shared about the Canadian elver fishery closure and its impacts on domestic fisheries, some shared success stories were discussed as a deterrent to illegal trade of the side value resource. We also discussed, or continued to discuss the interstate wildlife violators compact. The Committee continued to discuss how best to implement and use the Interstate Violators Compact, specifically state agencies share best practices among each state on how to model their respective programs.
As you know, I've jumped into trying to offer you guys some notable case works that is being done out there, so I'm going to jump through these pretty

quick. A federal grand jury in the District of Puerto Rico returned an indictment February 29, 2024, charging two Dominican nationals for smuggling goods from the United States. He got trafficking and failure to yield too.

During a morning patrol a customs and boarder protection aircraft detected suspicious vessel, approximately 39 nautical miles north of Arecibo, Puerto Rico. The United States Coast Guard responded to intercept the vessel, which was flagless and outfitted for smuggling. On approach, the defendants failed to heave to, obligating the United States Coast Guard to neutralizes the vessel. Strong words there, but yes, they shot up the motors.

The defendants were caught onboard in possession of approximately 22 bags of over 5,000 live American eels per bag that were being transported from Puerto Rico to Dominican Republic. This case is still under investigation through NOAA and U. S. Fish and Wildlife Offices of Law Enforcement and the case is being prosecuted through the Environmental Crime Section of the U.S. Department of Justice, and the U.S. Attorney's Office for the District of Puerto Rico.

Just a side note on this. The case is being prosecuted by the Environmental Crime Section of the U.S. Department of Justice. Wayne Hettenbach sits on our committee; he is such a high-level guy to have as an advisor and consultant in our deliberations. He is invaluable to us. A little closer to home. New Jersey officers charged North Carolina commercial fishing vessel owner and operator, after identifying violations against New Jersey's possession in excess of a daily limit license.

The license allows commercial fishing vessels to enter New Jersey ports with summer flounder and black sea bass that will eventually be landed in other states. The vessel must properly be licensed, and the excess fish must be lawfully landed and sold in the intended state. In this situation, the vessel operator landed a trip limit of New Jersey summer flounder in Cape May, and declares intention for the excess summer flounder onboard to be landed and sold in Virginia. When the vessel left New Jersey, it immediately transited to Massachusetts, landing in New Bedford. Jersey officers contacted Massachusetts authorities, who conducted an inspection of the vessel and determined the excess summer flounder was unlawfully filleted at sea, and concealed in various places onboard. The operator admitted to also discarding an additional amount of excess summer flounder on the way into port.

The vessel captain was also charged in Massachusetts for landing summer flounder without a permit, and for filleting at sea. The final case I would like to highlight, Connecticut Encon police, several regions of the state worked collaboratively to patrol the lower Housatonic River, from November 1st 2023 through April 9, 2024. This area is a known hot spot for striped bass poaching, especially during the winter months.

Fourteen officers voluntarily worked overnight shifts, utilizing Fish and Game detection canines, night vision and surveillance to identify violations to take enforcement action. This enforcement initiative accounted for the following documented activity, $32,343 dollars in fines levied for stripe bass violations, 385 counts of violations of Connecticut striped bass regulations were documented, 374 calls of service, 120 violators were issued an infraction or a warning, and 49 striped bass were located by the Fish and Game detection canine.

Additionally, one offender had his fishing license suspended. This was due to being cited for violations on four previous instances during this initiative. He was caught a fifth time, and charged again with fishing while suspended, along with new striped bass violations. Mr. Chair, that is my brief report. Thank you.

CHAIR CIMINO: Thank you, Kurt, and I'm going to ask a very specific question of the Policy Board here, and that is, do you have any urgent questions or comments? Otherwise, I would strongly encourage if you could reach out to him offline. Loren.

MR. LOREN W. LUSTIG: I'll certainly make this brief. Several examples of what you just said, Sir, related to something that is of concern to me. We've talked in the past about violators considering fines simply a

cost of doing business. Would the example of the person who had his license suspended, if he has been already caught four times, this is the fifth time. Wouldn't we need to increase the pain on that guy, to make sure that there was a cessation of this kind of activity?

MR. BLANCHARD: I appreciate that, Loren. In this particular case, this guy is egregious. He was paying fines of up to $2,000.00 for each of the previous offenses, so it was a cost of doing business. It is my understanding that Connecticut is moving forward with revocation of his privileges.

LETTER FOR CONSIDERATION ON AMERICAN EEL RESOURCE MANAGEMENT

CHAIR CIMINO: We'll move on to Other Business, and Pat, I'm going to start with you, since it was your request to put this item that Mitch brought to us on there. If you can give us a little bit of an intro, and we'll allow Mitch some time as well.

MR. KELIHER: Yes, I'll be brief, and maybe we can try to wrap this up very quickly. Mr. Feigenbaum raised some issues associated with Canada. I want the Policy Board to know that the Maine Department of Marine Resources have been heavily involved with DFO in Canada. We've had them down as guests, both Policy and Law Enforcement at very high levels within DFO, to understand how we manage our elver fishery in Maine.

We've gone over all of our laws and rules with them. I've met with the Fisheries Minister down at the Boston Seafood Show to stress the importance of the totality of these laws and rules, as they exist within the state of Maine, and how they have really helped subside all of the other illegal activities that we have on the east coast.

I think that was highlighted within the Law Enforcement reports that while we're never going to get rid of poaching of eels, the level of poaching up and down the east coast has certainly subsided, and I think our Law Enforcement Committee Rep could verify that. But what we have happening now in Maritime Canada is, what we were seeing when the price spiked in the United States and we didn't have these other rules in place.

I was invited to speak to the Parliament, the Senate Subcommittee Parliament for Fisheries and Oceans. I presented all of the information to them. It is clear that there is interest in trying to move forward within Canada. But I think it is really imperative upon us, as a body, to signal to DFO, in maybe not such an ordinary way that we would encourage them to act as quickly as possible. Because what is happening in Canada is impacting the domestic legal trade of elvers in the United States.

You can clearly see that with the price per pound issue that is being paid in Maine this year. With that, Mr. Chairman, I would recommend sending a letter to the U.S. Embassy in Canada, and to the Ambassador, to keep up to the United States to Canada, and request that he encourage the country to implement rules and regulations that would be protective of the resource, because ultimately this is a resource question. I'm not going to speak to the validity of what some report is saying that Mitch represented, but Maine Marine Patrol is directly engaged with Canada.

We're getting weekly updates on illegal activity there. The Law Enforcement Committee probably heard a lot of details in their closed session, as it pertains to what is happening in Canada, hundreds of arrests, 20 or 30 trucks have been seized. The amount of illegal activity is staggering, far beyond what we probably saw in this country, actually. I think it is imperative that we voice our concerns to them through appropriate channels.

CHAIR CIMINO: Okay, since we're starting off with a motion, I would like to get that motion up. I'll look for a second. I'll keep it for the Board first, Mitch, but I will allow you to speak on this as well. A second from Cheri.

MS. KERNS: Pat, can you help us a little, that was a lot, and so how do you want us to concisely put it in a motion?

MR. KELIHER: I **move to send a letter to the U.S. Ambassador in Canada encouraging Canada to implement rules and laws as quickly as possible, to ensure the protection of the American eel resource.**

CHAIR CIMINO: Cheri are you still okay with that? I realize we haven't gotten it up yet. But as Pat has worded it.

MR. RUCCIO: Mr. Chair, perhaps while they are perfecting the motion, I would make a similar comment, I think, on this level of correspondence. Again, you know I think the Policy Board is well within its rights to communicate how it sees fit. But looping in the federal agency that is a management partner could be of benefit here, so using IATC and just kind of looping in NOAA.

CHAIR CIMINO: Absolutely, thanks Mike. That is acknowledged and agreed to. Pat, do you feel that wording is appropriate here? Cheri, are you seconding this, okay. We have a motion with a second. Any discussion on this motion? I don't see any hands from the Board, so Mitch, do you have any comments? If you do, yes, quickly.

MR. FEIGENBAUM: I do, and it will be very quick. I just wanted to assure the Board that the Ambassador Cohen and his staff have been briefed on this issue. They voted resources to this issue. They have been very receptive to input on this issue. When the industry made a similar request to Ambassador Cohen's staff, please ask the Ambassador to make this outreach, and the response was rather supportive.

Except the fact that such a request really needs to come from official sources, not a constituent, which is why I brought this to my colleagues at ASMFC, including Pat and others. Thank you very much for the consideration. I think this will be a very meaningful step, and I would like to say to Mike, I look forward to meeting him and talking about some of the ways NOAA could actually play a helpful role in this matter as well. Thank you.

CHAIR CIMINO: No, very good, thank you. Not seeing any further hands for comment. Oh, go ahead, Cheri.

MS. PATTERSON: Mike, while I appreciate NOAAs involvement, but should we also be including U.S. Fish and Wildlife Service in that as a partner to this process, considering their management of eels?

CHAIR CIMINO: We'll acknowledge that as looping in our federal partners. With that, I'll just ask. **Is there any objection to this motion for this letter? No seeing any; approved by consent.** Hopefully that covers everything unless there is any other, again, urgent other items to come before the Board. Oh, Bob.

EXECUTIVE DIRECTOR ROBERT E. BEAL: More of a statement than a conversation provoking thing, I hope. We've been notified by a couple states that you may not have received your invoice for the annual Commission dues or appropriations. If your state did not receive that invoice, let us know. They should have been sent out March 29, I believe, but we have been told by a couple states they didn't get them. I don't know if this is part of our e-mail glitch, but if you didn't get yours, let us know. That's all, thanks, Joe.

CHAIR CIMINO: No problem, noted.

ADJOURNMENT

CHAIR CIMINO: With that I would like to adjourn our meeting. As mentioned before, there is no need for a Business Session, thank you.

(Whereupon the meeting adjourned at 12:15 a.m. on Thursday, May 2, 2024.)

ASSOCIATION of FISH & WILDLIFE AGENCIES

The voice of fish and wildlife agencies

1100 First Street, NE, Suite 825
Washington, DC 20002
Phone: 202-838-3474
Fax: 202-350-9869
Email: info@fishwildlife.org

Ms. Naimah Aziz
Division of Management Authority
U.S. Fish and Wildlife Service
International Affairs
5275 Leesburg Pike, MS:IA
Falls Church, VA 22041-3803

Reference: FWS/DMA/FISH 3-21

Dear Ms. Aziz:

Thank you for your letter of May 15, 2024, asking for the Association of Fish and Wildlife Agencies' (Association) preliminary assessment of a potential listing of American eel (*Anguilla rostrata*) in Appendix III pursuant to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

In developing this response, we consulted closely with the Atlantic States Marine Fisheries Commission (ASMFC) since their member agencies are the competent authorities concerning the management and conservation of American eel, in all its life stages.

Through the American Eel Management Board (Board), the ASMFC closely monitors commercial and recreational take of American eel throughout its range on the Atlantic Coast. Based on the most recent Benchmark Stock Assessment (2023), the Board established a new commercial quota for yellow eel (518,281 pounds), and maintained the glass eel quota in Maine (9,688 pounds). Eel harvest for both life stages is closely monitored. Maine's glass eel fishery is highly regulated, including meaningful penalties, to ensure sustainable and legal harvest.

There are two primary concerns about an Appendix III listing that are shared by the Association and ASMFC, which are based on the premise that an Appendix III listing must not have an adverse impact on the managed exports of American eel.

1. Since an Appendix III listing would require the development and implementation of a means of certifying legal acquisition by the competent authorities (the states), and such systems do not currently exist in all jurisdictions, a considerable amount of planning

would be required to ensure minimum disruption of trade. We ask that the USFWS provide the criteria for securing a Legal Acquisition Finding (LAF) for American eel to the Association and the ASMFC. The implementation of any new system may have considerable budgetary implications for the agencies, along with costs imposed on the harvesters. Understanding what a LAF will require is the first step in understanding the budget implications, as well as the process implication for harvest monitoring (e.g. daily electronic vs monthly reporting requirements).

For these reasons, the Association and ASMFC maintain that those legal acquisition systems must be conceptually planned then tested and agreed to prior to an Appendix III listing proposal. We request that the Office of Management Authority work with the Association and ASMFC to develop those concepts in advance of a formal listing proposal.

Moreover, the trade of eels often involves live specimens. Once eels have been packed for export the box cannot be unsealed without undergoing the complete intricate steps of re-packing and eel must be swiftly moved for shipment, or risk mortality. Once sealed most shipments make it to the destination within 36 hours. For this reason, it is crucial that CITES export permits be issued without delay, once a LAF is made. We have concerns regarding the timeliness of permit issuance, and request a discussion with the USFWS about how long they anticipate it taking to issue a permit.

2. The Association and ASMFC request confirmation of the process the USFWS would use to remove American eel from Appendix III if future trade data analysis demonstrates there are no significant conservation status concerns associated with exports of American eel. USFWS has stated it has the regulatory authority to remove any species from Appendix III. However, the criteria to remove them as outlined in the Code of Federal Regulations is that exports are fewer than 5 shipments per year or fewer than 100 individuals. It is our opinion that the criteria are so restrictive American eel would never be removed from Appendix III unless listed in Appendix II. For example, one pound of elvers contains anywhere from 2,000-4,000 individual eels. The Association believes that this is an important policy issue and would like to work collaboratively with the USFWS on resolving it.

In addition, the Association and ASMFC would like to better understand what additional conservation is being accomplished by with an Appendix III listing of American eel. Most US exports are known. The elver fishery, which was worth almost 20 million dollars in 2023 in Maine, is one of the most regulated and monitored fisheries in the country. The Maine elver fishery exports can be tracked back to the harvester through Maine's monitoring program which uses NFC tokens. The ASMFC is concerned a listing, without clarity of what the USFWS will require and advanced agreement on the process to receive a LAF, would significantly harm this highly valuable fishery.

The Association and ASMFC do not recommend the USFWS propose an Appendix III listing until the concerns raised in this letter have been satisfactorily addressed by all parties. We are prepared to engage on short notice to ensure a timely resolution of these issues and we look forward to hearing from you.

Sincerely,

Ryan Brown
AFWA International Relations Committee Co-Chair
Executive Director, Virginia Department of Wildlife Resources

Robert E. Beal
Executive Director ASMFC

Cc: Chuck Sykes, President, Association of Fish and Wildlife Agencies
CITES Technical Work Group

.....

(Original Signature of Member)

118TH CONGRESS
2D SESSION

H. R. _____

To require the Administrator of the National Oceanic and Atmospheric Administration to reform the Marine Recreational Information Program of the National Marine Fisheries Service, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Mr. GRAVES of Louisiana introduced the following bill; which was referred to the Committee on _____

A BILL

To require the Administrator of the National Oceanic and Atmospheric Administration to reform the Marine Recreational Information Program of the National Marine Fisheries Service, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Fisheries Data Modernization and Accuracy Act of 2024''.

SEC. 2. DEFINITIONS.

In this Act:

(1) ADMINISTRATOR.—The term ''Administrator'' means the Administrator of the National Oceanic and Atmospheric Administration, acting through the Director of the National Marine Fisheries Service.

(2) FISHERY.—The term ''fishery'' has the meaning given the term in section 3 of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1802).

(3) INDEPENDENT ENTITY.—The term ''independent entity''—

(A) means an entity that—

(i) is not a unit of the National Oceanic and Atmospheric Administration; and

(ii) has expertise in areas of science related to fishery stock assessments; and

(B) includes—

(i) the National Academies of Sciences, Engineering, and Medicine; and

(ii) an institution of higher education (as such term is defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)).

(4) MRIP.—The term ''MRIP'' means the Marine Recreational Information Program of the National Marine Fisheries Service.

(5) NATIONAL ACADEMIES.—The term ''National Academies'' means the National Academies of Sciences, Engineering, and Medicine.

(6) PSE.—The term ''PSE'' means the percent standard error.

(7) PULSE SPECIES.—The term ''pulse species'' means a species that, due to regulatory constraints or the movement or availability of the species on a seasonal basis—

(A) is caught—

(i) on an intermittent or infrequent basis; or

(ii) only during an abbreviated timeframe; and

(B) is likely not sampled in a representative manner by data collected through the MRIP.

(8) REGIONAL FISHERY MANAGEMENT COUNCIL.—The term ''Regional Fishery Management Council'' means a Regional Fishery Management Council established under section 302 of the Magnu-

son-Stevens Fishery Conservation and Management Act (16 U.S.C. 1852).

(9) REGIONAL STATE FISHERIES COMMISSION.—The term ''regional State fisheries commission'' means each of—

(A) the Atlantic States Marine Fisheries Commission;

(B) the Gulf States Marine Fisheries Commission; and

(C) the Pacific States Marine Fisheries Commission.

(10) SCIENTIFIC AND STATISTICAL COMMITTEE.—The term ''scientific and statistical committee'' means a scientific and statistical committee established pursuant to section 302(g) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1852(g)).

(11) SEASONAL FISHERY.—The term ''seasonal fishery'' means a fishery—

(A) that is subject to an annual closed season; or

(B) that may be affected by in- or post-season accountability measures that result in fishing or harvest closures.

(12) STANDING COMMITTEE.—The term ''standing committee'' means the standing committee established pursuant to section 2(b)(1).

(13) STOCK OF FISH.—The term ''stock of fish'' has the meaning given the term in section 3 of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1802).

(14) WAVE.—The term ''wave'' means the shortest period in which MRIP data are aggregated and reported for use in management decisions.

SEC. 3. RECREATIONAL FISHING DATA COLLECTION REFORM.

(a) IN GENERAL.—The Administrator shall reform the MRIP in effect as of the date of the enactment of this section to meet the unique needs of individual regions and States, taking into consideration the needs of State-level programs related to recreational fishing catch and effort surveys in effect as of the date of the enactment of this section to ensure that such reform does not unnecessarily dilute the effectiveness of such programs.

(b) NATIONAL ACADEMIES.—

(1) STANDING COMMITTEE.—

(A) IN GENERAL.—The Administrator shall enter into an agreement with the National Academies to establish a standing committee

within the National Academies that shall meet regularly to discuss issues related to recreational fisheries data collection and management.

(B) INDEPENDENCE.—In carrying out this subsection, the standing committee shall operate independently and without the influence of the Administrator.

(C) COMPOSITION.—The standing committee shall include individuals who are experts in recreational fisheries data collection and management, including representatives from State fish and wildlife agencies.

(2) CONSULTATION REGARDING PSE.—

(A) IN GENERAL.—If the PSE for data collected through the MRIP for a given seasonal fishery reaches or exceeds 30 percent in a given wave, or if a State submits a petition with respect to a given seasonal fishery under paragraph (4), the Administrator shall consult with the standing committee regarding options—

(i) to reduce the PSE of such seasonal fishery; or

(ii) if reducing the PSE is not practicable, to adjust the management of such seasonal fishery, including by using the management approaches described in section 302(h)(8) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1852(h)(8)) or multi-year annual catch limits.

(B) REPORT.—After the Administrator consults with the standing committee under subparagraph (A) with respect to a seasonal fishery described in that subparagraph, the Administrator shall, not later than 6 months after the date on which either the PSE for data collected through the MRIP for such seasonal fishery exceeds 30 percent in a given wave or the Administrator receives a petition submitted by a State under paragraph (4), publish a report specifying—

(i) the options considered under that subparagraph (A);

(ii) the recommendation of the Administrator regarding how—

(I) to reduce the PSE for data collected through the MRIP for such seasonal fishery; or

(II) to adjust the management of such seasonal fishery in a manner that allows continued access and considers recommendations contained in the report submitted to Congress under section 102 of the Modernizing Recreational Fisheries Management Act of 2018 (Public Law 115–405); and

(iii) the reasoning, written in a manner easily understood by the public, for giving such recommendation.

(C) REGIONAL FISHERY MANAGEMENT COUNCIL.—If the Administrator publishes a report under subparagraph (B) with respect to a seasonal fishery described in subparagraph (A), the Administrator shall send such report to the relevant Regional Fishery Management Council for consideration.

(3) CONSIDERATION.—In carrying out paragraphs (1) and (2), the Administrator and the

standing committee shall consider issues including the following:

(A) Whether the data collected through the MRIP is appropriate and useful for management decisions, including options to improve data collection methods.

(B) The extent to which existing and potential data collection options are—

(i) burdensome to anglers; and

(ii) an efficient or appropriate use of resources.

(C) Whether and to what extent specific recommendations from the report published by the National Academies titled ''Data and Management Strategies for Recreational Fisheries with Annual Catch Limits'' (2021) and other relevant National Academies activities can and should be applied in light of the particular context of the fishery being considered.

(4) PETITION TO INITIATE CONSULTATION.—A State may submit to the Administrator a petition for the Administrator to initiate the consultation process under paragraph (2) with respect to a given seasonal fishery if—

(A) the PSE for data collected through the MRIP for such seasonal fishery is—

(i) significantly greater or less than the preceding 3-year average PSE for such seasonal fishery; or

(ii) substantially greater than the PSE for data collected through State surveys for such seasonal fishery; or

(B) data collected through the MRIP for such seasonal fishery is unreliable because the stock of fish of such seasonal fishery is—

(i) infrequently encountered through MRIP surveys; or

(ii) a pulse species.

(5) COMBINED REPORTS.—In carrying out this subsection, the Administrator may carry out a single consultation with the standing committee under paragraph (2) with respect to 2 or more species if the Administrator and the standing committee jointly determine the underlying issues that triggered the consultation are highly similar.

(c) RULE OF CONSTRUCTION.—Nothing in this section may be construed to override the role of the scientific and statistical committees in advising the Regional Fish-

ery Management Councils regarding recommendations developed pursuant to this section.

SEC. 4. STATE RECREATIONAL FISHERY CATCH AND EFFORT DATA COLLECTION.

(a) STATE RECREATIONAL FISHERY CATCH AND EFFORT DATA COLLECTION PROGRAM.—

(1) IN GENERAL.—A State may, subject to the approval of the Administrator, carry out a program within the waters of such State and Federal waters to collect recreational fishing catch and effort data for individual, or sets, of species that are federally managed.

(2) REQUIREMENTS.—If a State carries out a program under paragraph (1), the head of such program shall—

(A) ensure that such program complies with paragraph (3);

(B) collect recreational fishery catch and effort data with respect to such State;

(C) report such data that is necessary for Federal management to the Administrator in a manner and timeliness that complies with section 401 of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1881); and

(D) take into consideration the burden of such program to the average angler such that such program is not overly burdensome to the point that substantial noncompliance would be expected.

(3) DATA REQUIREMENTS.—The Administrator, in consultation with the regional State fisheries commissions, shall, with respect to data collected through a recreational fishery catch and effort data collection program of a State carried out under this subsection—

(A) establish universal standards regarding the collection of such data, including ensuring that such standards—

(i) allow for flexibility in the design of such programs to account for differences in recreational fishing activity between States; and

(ii) facilitate the collection of comparable data between States within a region for the purposes of stock assessments and management;

(B) establish such data as the baseline for the calibration of historic estimates of recreational catch; and

(C) use such data to establish catch limits and monitor landings without calibration to any Federal program, including the MRIP.

(4) USE OF STATE DATA.—

(A) IN GENERAL.—Data collected through a State program carried out under this subsection may be used in Federal stock assessments and regulatory actions.

(B) MRIP.—If a State collects data pursuant to this subsection that is collected pursuant to the MRIP, the Administrator shall use the data collected by the State in place of the data collected pursuant to the MRIP.

(5) SUBSEQUENT FUNDING.—Upon approval by the Administrator of a recreational fishery catch and effort data collection program of a State under paragraph (1), funding previously allocated to such State for the collection of recreational fishery catch and effort data through the MRIP shall continue to be allocated to such State for such State to carry out such program of the State.

(b) GRANT PROGRAM.—

(1) IN GENERAL.—Not later than 180 days after the date of the enactment of this section, the Administrator shall establish and carry out a grant

program to award amounts to States to develop, with respect to each such State, a new, or improve an existing, program described in subsection (a).

(2) APPLICATIONS.—To be eligible for a grant under this subsection, a State shall submit to the Administrator an application in such form, at such time, and containing such information as the Administrator determines appropriate.

(3) USE OF FUNDS.—A State that is awarded a grant under this subsection shall use such award—

(A) to support the development or improvement of a program described in subsection (a) of such State;

(B) to enhance the timeliness of reporting by such State of data collected by such State through such program; and

(C) to increase the accuracy and precision of the data collected by such State pursuant to such program.

(4) PRIORITY.—In awarding grants under this subsection, the Administrator shall give priority to applications—

(A) based on the ability of the award to reduce the uncertainty of data collected through the MRIP, including with respect to—

(i) economically or socially important species;

(ii) species a fishery of which is at risk of closure; and

(iii) species a fishery of which is at risk of closing another fishery because the management of both fisheries are intermingled; and

(B) that would alter or improve an existing State program carried out under subsection (a) to meet the requirements under subsection (a)(3).

(c) REPORT.—On the date that is 2 years after the date of the enactment of this section, and biennially thereafter, the Administrator shall submit to the appropriate congressional committees and make publicly available a report regarding the implementation of this section that includes—

(1) the number of States that have participated in the grant program established under subsection (b);

(2) a description of each State recreational fishery catch and effort data collection program;

(3) a description of how the Administrator incorporates data collected pursuant to each such program in fishery stock assessments, fishery management decisions, and catch monitoring; and

(4) an analysis regarding the improvement in data precision and the accuracy of data collected pursuant to each such program compared to data collected through the MRIP.

(d) RULE OF CONSTRUCTION.—Nothing in this section may be construed to negate, uncertify, or otherwise undo existing State programs to collect recreational fishing catch and effort data.

SEC. 5. HEALTHY FISHERIES THROUGH BETTER SCIENCE.

(a) DEFINITION OF STOCK ASSESSMENT.—Section 3 of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1802) is amended—

(1) by redesignating paragraphs (43) through (50) as paragraphs (44) through (51), respectively;

(2) by inserting after paragraph (42) the following:

''(43) The term 'stock assessment' means an evaluation of the past, present, and future status of a stock of fish, including—

"(A) a range of life history characteristics for such stock of fish, including, to the extent practicable—

"(i) the geographical boundaries of such stock of fish; and

"(ii) information regarding age, growth, natural mortality, sexual maturity and reproduction, feeding habits, and habitat preferences of such stock of fish; and

"(B) fishing for the stock of fish."; and

(3) by redesignating the second paragraph (33) as paragraph (52).

(b) STOCK ASSESSMENT PLAN.—

(1) IN GENERAL.—Section 404 of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1881c) is amended by adding at the end the following:

"(f) STOCK ASSESSMENT PLAN.—

"(1) IN GENERAL.—The Secretary shall develop and publish in the Federal Register, on the same schedule as required for each strategic plan required under subsection (b), a plan to conduct stock assessments for priority stocks of fish for which a fishery management plan is in effect under this Act.

''(2) CONTENTS.—Each plan described in paragraph (1) shall—

''(A) for each priority stock of fish for which a stock assessment has previously been conducted—

''(i) establish a schedule for updating the stock assessment that is reasonable given the biology and characteristics of the stock of fish; and

''(ii) subject to the availability of appropriations, require completion of a new stock assessment, or an update of the most recent stock assessment—

''(I) every 5 years; or

''(II) within such other time period specified and justified by the Secretary in the plan;

''(B) for each priority stock of fish for which a stock assessment has not previously been conducted—

''(i) establish a schedule for conducting an initial stock assessment that is reasonable given the biology and characteristics of the stock; and

"(ii) subject to the availability of appropriations, require completion of the initial stock assessment not later than 3 years after the date on which the plan is published in the Federal Register unless another time period is specified and justified by the Secretary in the plan; and

"(C)(i) identify data and analysis, including both data and analysis that is and is not available at the time the plan is prepared, that would reduce the uncertainty, improve the accuracy, and increase the efficiency of future stock assessments; and

"(ii) with respect to data and analysis identified under clause (i), determine whether such data and analysis could be provided by fishermen, fishing communities, universities, and research institutions, to the extent that the use of such data would be consistent with the requirements in section 301(a)(2).

"(3) WAIVER OF STOCK ASSESSMENT REQUIREMENT.—Notwithstanding subparagraphs (A)(ii) and (B)(ii) of paragraph (2), a stock assessment is not required for a stock of fish in the plan described in paragraph (1) if the Secretary determines that such

stock assessment is not necessary and justifies such determination in the Federal Register notice required by this subsection.''.

(2) DEADLINE.—Notwithstanding section 404(f)(1) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1881c(f)(1)), as added by this section, the Secretary of Commerce shall issue the first stock assessment plan under section 404(f) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1881c(f)), as added by this section, not later than 2 years after the date of the enactment of this section.

SEC. 6. FISHERY-INDEPENDENT SURVEYS BY INDEPENDENT ENTITIES.

(a) IN GENERAL.—The Administrator shall establish a program to enter into contracts with independent entities on a competitive basis under which such independent entities shall conduct fishery-independent surveys designed to estimate the absolute abundance of stocks of fish included in the Fish Stock Sustainability Index on behalf of the Administrator.

(b) APPLICATIONS.—To be eligible to enter into a contract under the program established under subsection (a), an independent entity shall submit to the Adminis-

trator an application in such form, at such time, and containing such information as the Administrator determines appropriate, including evidence of the following:

(1) Use by the independent entity of modern or cutting-edge science.

(2) The ability of the independent entity to handle data in a reliable manner.

(c) USE OF DATA.—Upon favorable peer review, the Administrator, in consultation with the relevant scientific and statistical committees and independent entity and with consideration of the report submitted under section 7, shall incorporate data collected pursuant to a fishery-independent abundance survey conducted by an independent entity under the program established under subsection (a) in management decisions.

(d) REPORT.—The Administrator shall annually submit to the Committee on Natural Resources of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report regarding the findings of surveys conducted pursuant to this section and the incorporation of the results of such surveys in management decisions pursuant to subsection (c).

SEC. 7. REPORT.

Not later than 1 year after the date of the enactment of this section, the National Academies, in consultation

with the Harte Research Institute for Gulf of Mexico Studies, shall submit to the Committee on Natural Resources of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate and make publicly available a report regarding—

(1) the incorporation of the results of the study titled ''Estimating the Absolute Abundance of Age-2+ Red Snapper (Lutjanus campechanus) in the U.S. Gulf of Mexico'' (August 16, 2021) in management decisions of the National Marine Fisheries Service; and

(2) recommendations regarding the incorporation of data collected pursuant to section 6 in management decisions of the National Marine Fisheries Service.

SEC. 8. TRANSPARENCY AND PUBLIC PROCESS.

(a) ADVICE.—Section 302(g)(1)(B) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1852(g)(1)(B)) is amended by adding at the end the following: ''Each scientific and statistical committee shall develop such advice in a transparent manner and allow for public involvement in the process.''.

(b) MEETINGS.—Section 302(i)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (16

U.S.C. 1852(i)(2)) is amended by adding at the end the following:

"(G) Each Council shall make available on the Internet website of the Council—

"(i) with respect to each meeting of the Council and Council coordination committee established under subsection (l) that is not closed in accordance with paragraph (3), to the extent practicable, a Webcast, live audio recording, or live broadcast of each such meeting; and

"(ii) with respect to each meeting of the Council and of the scientific and statistical committee established by the Council under subsection (g)(1)(A) that is not closed in accordance with paragraph (3), by not later than 30 days after the conclusion of each such meeting, an audio or video (if the meeting was held in person or by video conference) recording or a searchable audio or written transcript of each such meeting.

"(H) The Secretary shall maintain and make available to the public an archive of each recording and transcript made available under subparagraph (G).".

Electronic Monitoring and Reporting Grant Program: 2024 Request for Proposals

Overview for Prospective Applicants

The National Fish and Wildlife Foundation (NFWF) is soliciting proposals for its Electronic Monitoring and Reporting (EMR) Grant Program, which will award grants that catalyze the implementation of electronic technologies (ET) for fisheries catch, effort, and/or compliance monitoring, and improvements to fishery information systems in U.S. fisheries. Examples of past projects funded through the program can be found here. NFWF anticipates awarding up to $4.8 million through this solicitation, with most awards falling between $200,000 and $500,000. Matching contributions from non-federal sources (cash and in-kind) must equal or exceed the requested amount (i.e., a 1:1 match). **Proposals are due on Monday, October 2, 2024 by 11:59 pm ET**. NFWF will host an informational webinar to provide details on this opportunity on Wednesday, July 31, 2024, from 3:00-4:00 pm ET: Register here.

Program Priorities:

The EMR Grant Program is focused on two major priorities:

1) ***Electronic technology in fishery data collection***: Improve reporting and monitoring of fisheries, including but not limited to assisting commercial and recreational fisheries with planning, developing, and executing effective EMR strategies.
2) ***Modernize data management systems*** in order to reduce costs and improve consistency, interoperability, quality, and/or usability of electronically-collected information.

Proposals should address these priorities by either: a) Scaling up proven electronic technologies/data management systems to broaden impacts; or b) Developing, testing, and/or piloting innovative solutions and approaches to known fisheries and data management challenges. ***Note:*** *The EMR Grant Program is not designed to fund ongoing administration of EMR programs to satisfy a fishery's regulatory requirements.*

An additional priority for 2024 focuses on implementing specific ET to collect fishing effort in Gulf of Mexico state-permitted shrimp fisheries. Please contact Gray Redding (gray.redding@nfwf.org) if interested in this new specific priority.

NFWF priority fisheries include the Gulf of Mexico reef fish fishery, the New England groundfish fishery, the West Coast groundfish fishery, and the Alaska halibut/groundfish fisheries; ***however***, other fisheries are fully eligible and have a strong history of receiving funding. If applicable, proposals should explain how projects will address NOAA Fisheries' regional ET priorities as outlined in the ET Regional Implementation Plans.

Eligibility:

- Eligible projects include those focused on U.S. state and federal fisheries, including tribal, commercial, recreational, or for-hire sectors.
- Eligible applicants include non-profit organizations, state government agencies/interstate commissions, local/municipal governments, Tribal governments/organizations, educational institutions, commercial (for-profit) organizations, and international organizations.
- *Ineligible* applicants include U.S. Federal government agencies, including Regional Fishery Management Councils, and unincorporated individuals.

Questions? Contact NFWF's EMR Program Liaison:

NFWF is working with **Willy Goldsmith of Pelagic Strategies** to assist prospective applicants with project scoping, identification of partners, and technical/logistical support through the grant application process. Please reach out to Willy by email at wgoldsmith@pelagicstrategies.com or by phone at (617) 763-3340 with any questions about this grant opportunity or the application process.

Anthropogenic Noise Impacts on Atlantic Fish and Fisheries: Implications for Managers and Long-Term Productivity

Prepared by: ASMFC Habitat Committee

With major contributions from:

R. Grant Gilmore, Jr., Michelle Bachman, Kate M. Wilke, Jessica Coakley, and Claire Enterline

Edited by: Brendan J. Runde

Contents

Report Objective

Many types of human-generated noise impact coastal and marine fishes through disruption of physiological processes and interruption of auditory communication. In turn, fish health and behavior can be affected. These impacts might be short-term or long-term and can lead to changes in spawning aggregations, habitat use, reproductive success, and mortality. The purpose of this report is to summarize the importance of the impacts of anthropogenic noise to fishes managed by the Atlantic States Marine Fisheries Commission.

While there is vast literature on the production and use of sound by marine mammals, including the effects of human-generated sound on these taxa, this is beyond the scope of this report, given ASMFC's fisheries management focus.

I. Introduction

The oceans are full of both natural and anthropogenic sounds. The auditory system is the most important sensory system for many aquatic organisms, including most fishes (Au and Hastings, 2008; Richardson et al., 2013; Staaterman et al., 2014, 2013; Stocker, 2002; Tavolga, 1980, 1960). Because water is denser and more viscous than air, the propagation of light and the diffusion of chemicals in water are both severely inhibited. In contrast, sound can move over four times faster and travel farther with less transmission loss underwater than it can through the air (Rogers and Cox, 1988; Ward, 2015).

Many human activities occurring in coastal and marine habitats add noise to the natural soundscape, and these noises affect aquatic organisms and their interactions with one another (Duarte et al., 2021). For example, as rates of sound production correlate to rates of spawning and reproductive success, any disruptions to the effective communication range for fish and invertebrate species has the potential to reduce reproductive output and recruitment.

This report aims to provide general information about the importance of sound to marine species, the impacts that anthropogenic noise can have on marine species, and the characteristics of natural sounds and anthropogenic noise. This document also describes mitigation measures for certain human-induced noise. Finally, the report provides references to a list of data gaps and research needs to improve our understanding of the impact of noise on marine organisms, including fish.

II. The natural soundscape and its importance to fishes

The natural soundscape of the ocean environment includes abiotic activity such as tectonic

activity, sea surface agitation, and sea ice activity. These sounds range from <10 Hz to >150,000 Hz with varying intensities and intermittency. Ocean waves and tectonic activity produce constant low frequency noises of a moderate intensity, while dramatic seismic events, such as earthquakes or volcanic eruptions, and glacier calving produce relatively short bursts of very loud sounds. Weather, such as precipitation or high wind speeds, contributes to surface agitation causing increased abundance of 100-10,000 Hz noise (Martin et al., 2014; Nowacek et al., 2007; Peng et al., 2015). Sea surface agitation results in secondary sources of noise such as bubbles or spray.

Some fishes and other marine animals produce sound intentionally as part of their communication, reproduction, predator avoidance, foraging, or navigation and orientation (Peng et al., 2015), as well as unintentionally while they move, forage, and release gas (Fine and Parmentier, 2015). Field and laboratory studies of fish physiology and behavior indicate that sound is a preferred sensory mechanism to detect predators or prey, find suitable habitat, orient, migrate, communicate, attract mates, and coordinate spawning (Putland et al., 2018). Not only do many species use sound to locate reproductive partners or indicate reproductive intent (Bass et al., 1997; Lamml and Kramer, 2005; Maruska and Mensinger, 2009; Montie et al., 2017), but some species, like the Pacific marine toadfish *Porichthys notatus*, become more sensitive to certain frequencies of their counterpart's sounds during periods of reproductive availability (Maruska et al., 2012; Sisneros, 2009). Rates of sound production correlate to rates of spawning and reproductive success. Territorial species use aggressive, threatening calls to delineate an individual's territory and intimidate or deter competitors or predators (Ladich, 1997; Maruska and Mensinger, 2009; Vester et al., 2004). Other uses of sound include navigation and orientation, especially for planktonic larval stages of fishes and invertebrates (Radford et al., 2011; Vermeij et al., 2010), avoidance of predators (Hughes et al., 2014; Remage-Healey et al., 2006), communication (Buscaino et al., 2012; Janik, 2014; Van Oosterom et al., 2016), and the determination of suitable habitats for settlement (Simpson et al., 2004).

Soniferous fishes managed by the ASMFC include most prominently members of the family Sciaenidae (e.g., Atlantic croaker *Micropogonias undulatus*, red drum *Sciaenops ocellatus*, and spotted seatrout *Cynoscion nebulosus*). However, evidence also exists of sound production from members of Clupeidae (e.g., Atlantic menhaden *Brevoortia tyrannus* and other shads and herrings), Acipenseridae (e.g., Atlantic sturgeon *Acipenser oxyrhincus*), Moronidae (e.g., striped bass *Morone saxatilis*), Serranidae (e.g., black sea bass *Centropristis striata*), Pomatomidae (e.g., bluefish *Pomatomus saltatrix*), and more (Fish et al., 1952; Fish and Mowbray, 1970; Johnston and Phillips, 2003; Rice et al., 2022; Wilson et al., 2004).

III. Sources of anthropogenic noise in the oceans

Noise generated from human activities covers the full frequency of sound energies used by marine fishes (Duarte et al., 2021). The contribution of human noise to the ocean soundscape has increased over time as activities such as shipping, mineral and oil mining, and coastal construction have grown in scale (Pijanowski et al., 2011). Novel and emerging human activities, such as offshore aquaculture and renewable energy development, also produce noise during construction, operation, maintenance, and eventual decommissioning.

Anthropogenic sources of ocean noise are acute (episodic) and chronic (ongoing or continuous). Both types may occur within estuaries, on the continental shelf, or in open-ocean regions. Acute sources include construction activities such as pile driving, dredging, cable laying, bridge removal, and seismic surveys. Chronic sources include vessel traffic (i.e., commercial and recreational boating and shipping activities) and energy production (e.g., operation of wind turbine generators, or oil and gas extraction).

Below, Figure 1 from Duarte et al. (2021) shows the duration and spatial scale of both natural sounds and anthropogenic noise in the ocean. It also compares the frequencies of marine animal sound production and hearing ranges with anthropogenic noise sources. These visual displays demonstrate that the scale, frequency, and extent of anthropogenic noise overlaps with the activity of marine animals' behavior in different ways.

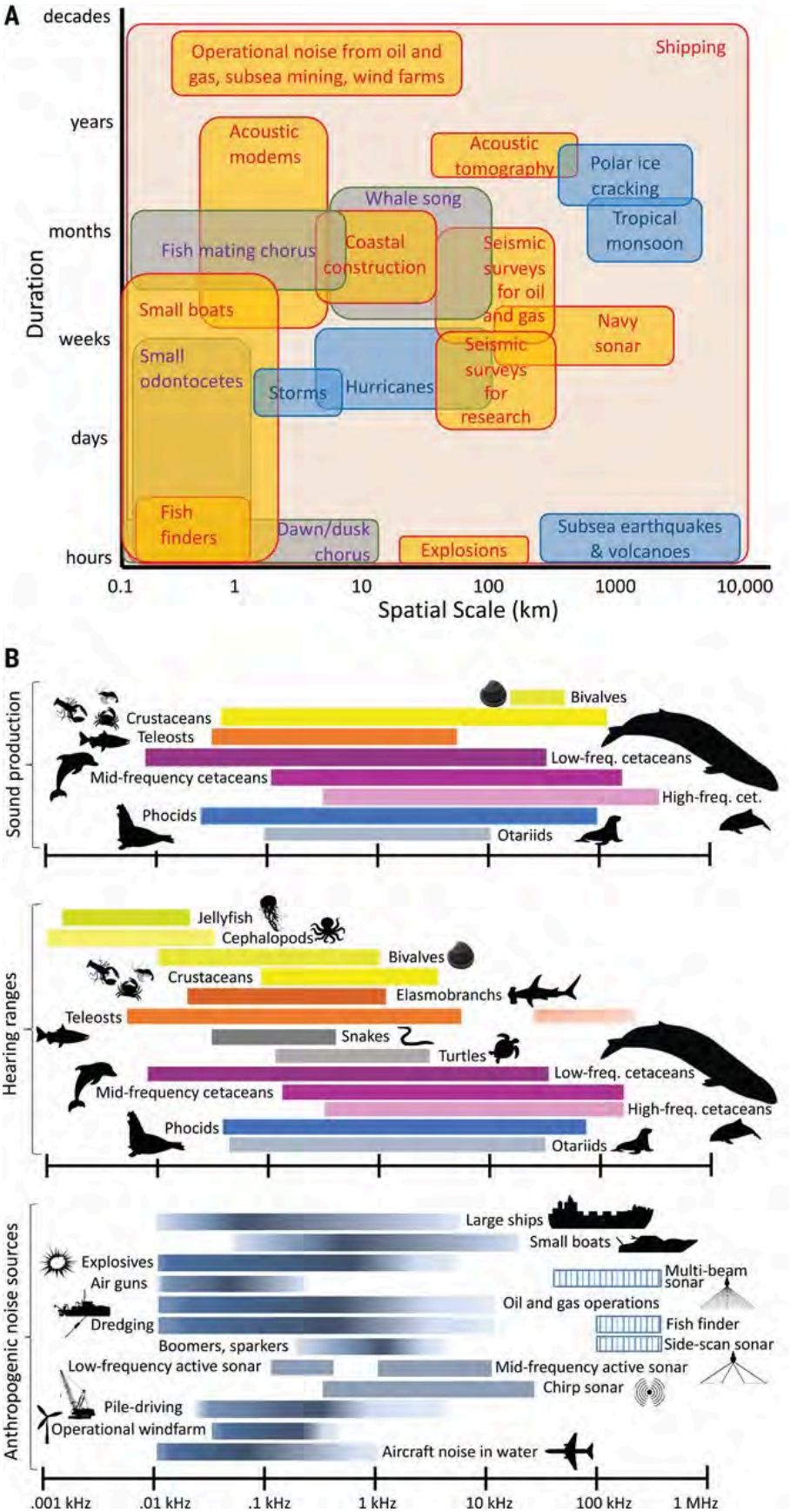
A
decades
years
months
weeks
days
hours
Duration
Operational noise from oil and gas, subsea mining, wind farms
Shipping
Acoustic modems
Acoustic tomography
Polar ice cracking
Whale song
Tropical monsoon
Fish mating chorus
Coastal construction
Seismic surveys for oil and gas
Small boats
Navy sonar
Small odontocetes
Storms
Hurricanes
Seismic surveys for research
Fish finders
Dawn/dusk chorus
Explosions
Subsea earthquakes & volcanoes
0.1
1
10
100
1000
10,000
Spatial Scale (km)
B
Sound production
Bivalves
Crustaceans
Teleosts
Low-freq. cetaceans
Mid-frequency cetaceans
High-freq. cet.
Phocids
Otariids
Hearing ranges
Jellyfish
Cephalopods
Bivalves
Crustaceans
Elasmobranchs
Teleosts
Snakes
Turtles
Low-freq. cetaceans
Mid-frequency cetaceans
High-freq. cetaceans
Phocids
Otariids
Anthropogenic noise sources
Large ships
Small boats
Explosives
Air guns
Multi-beam sonar
Oil and gas operations
Dredging
Fish finder
Boomers, sparkers
Side-scan sonar
Low-frequency active sonar
Mid-frequency active sonar
Chirp sonar
Pile-driving
Operational windfarm
Aircraft noise in water
.001 kHz
.01 kHz
.1 kHz
1 kHz
10 kHz
100 kHz
1 MHz

Figure 1 *(from Duarte et al 2021). Caption reproduced verbatim. (**A**) Stommel diagram showing the spatial extent and duration of selected biophony (rounded gray squares), geophony (rounded blue squares), and anthrophony (rounded yellow squares) events. Events (rounded squares) reflect the spatial and temporal period over which signals or bouts of signals typically occur. Although some sound sources, such as those used in hydrographic surveys, do not propagate particularly far, survey efforts can cover a large spatial extent (an entire Exclusive Economic Zone). "Dawn/dusk chorus" refers to the daily sounds produced by a collection of species (e.g., fish, snapping shrimp). Shipping noise encompasses the full range of spatial and temporal scales. (**B**) Approximate sound production and hearing ranges of marine taxa and frequency ranges of selected anthropogenic sound sources. These ranges represent the acoustic energy over the dominant frequency range of the sound source, and color shading roughly corresponds to the dominant energy band of each source. Dashed lines represent sonars to depict the multifrequency nature of these sounds.*

Vessel Activity

Watercraft of all kinds produce undersea noise and are the most common sources of anthropogenic noise in coastal waters (Stocker, 2002). These sources of noise can be amplified due to surface and seafloor reflections as well as scattering and reverberating because of the geography and geology of the submerged shoreline and bottom. Many watercraft generate low-frequency sound from propeller action, propulsion machinery, generators, and water flow over the hull (Hildebrand, 2005). The sounds generated from a large container vessel can exceed 190 decibels (dB) at the source (Jasny, 1999). Metropolitan areas and ports contain a diverse array of watercraft which constitute the dominant human-derived soundscape: commercial and private fishing boats, recreational watercraft, industrial vessels, public transport ferries, military craft, personal watercraft, and others. Significant underwater sound production can also be generated from bridge automobile traffic, particularly during peak traffic periods.

Additionally, most vessels have sonar systems for navigation, depth sounding, and "fish finding" that may cause acute or episodic noise disturbance. Some commercial fishing boats also deploy various acoustic deterrent devices to prevent negative interactions with dolphins, seals, and turtles (Stocker, 2002). There is little information on the effects of acoustic deterrent devices on fish, however.

Geological and Geophysical Surveys

Geological and geophysical (G&G) surveys are performed to gather information about the seafloor including bathymetry, surficial sediment, sub-surface sediment, and the topology of an area. These surveys are performed for a multitude of uses including resource extraction and wind power siting. Not all G&G surveys produce noise that is known to be within the

hearing range of marine animals.

Sonar systems are used for a wide variety of civilian and military operations. Active sonar systems send sound energy into the water column. Sonar systems can be classified into low (<1,000 Hz), mid (1,000 – 20,000 Hz), and high frequency (>20,000 Hz). Low and mid frequency systems emit sound that overlaps with the acoustic detection of many marine animals. Sub-bottom profilers are a type of high-resolution seismic system that produce imaging of the seafloor's sub-surface. These can be shallow penetration (2–20 m) or deep penetration systems and operate at a wide range of frequencies (400 – 24,000 Hz) and produce varying levels of peak sound (212- 250 dB; (Mooney et al., 2020)). Seismic air guns are used for a deeper penetration of acoustic sound into the seafloor and are used primarily for oil and gas exploration and siting of offshore cables. Air guns generally produce sound at 200-210dB at a range below 100 Hz. While morbidity of fish and other animals has not been associated with air gun exposure, changes in behavior have been observed. Following exposure in a laboratory setting, American lobster *Homarus americanus* changed their feeding levels, and physiological changes were also measured (Payne et al., 2007).

Studies investigating the effect of full-scale G&G surveys on wild fish populations have shown effects in some cases. Atlantic herring *Clupea harengus* schools in the wild were not observed to change their swimming speed, swimming direction, or school size during exposure to a full-scale seismic survey (Peña et al., 2013). However, other studies have found that trawl and long-line fish catches during full-scale G&G surveys decreased within the area of the seismic survey and at ranges of up to 33 km (Engås et al., 1996). When catch rates and behavior were observed to change during seismic surveys, fish were observed to return to the site of the survey within hours or days after the survey completion (Løkkeborg et al., 2012).

High frequency sonar telemetry is associated with vessel positioning, locating, steering, and remotely operated vessel control. Ultrasonic frequencies (generally 200,000 - 400,000 Hz), also known as multibeam echosounders, are used for sonar mapping. Multibeam echosounder surveys collect bathymetry and seafloor hardness information used for nautical chart updates, benthic habitat characterizations, fisheries habitat modeling, and surficial sediment analysis. These ultrasonic frequencies are generally outside of the known range of acoustic detection by marine animals.

Renewable Energy Construction & Operation

Renewable energy is a growing segment of the United States' electrical generation portfolio as we attempt to combat climate change and become more energy secure (Chow et al., 2003; Dincer, 1999; Pimentel et al., 2002; Valentine, 2011). While the nation's renewable energy

portfolio has to date been mainly composed of land-based technologies, coastal and marine energy sources in the form of tides, currents, waves, and especially offshore wind have the potential to provide a large amount of energy to the future power grid (Pelc and Fujita, 2002). These energy sources are not without impacts to marine fish welfare, movements, and behavior. The impacts of offshore wind development on the marine environment have been widely discussed in recent years, and monitoring of wind farms in Europe has generated some knowledge about long-term effects (e.g., Gimpel et al., 2023; Stenberg et al., 2015), from which we along the U.S. Atlantic coast can learn. Along the U.S. Atlantic only a handful of projects are built or currently under construction, although many more have been or will soon be permitted. The effects of offshore wind farms on this ecosystem are just beginning to be examined, thus it is likely we will learn more as construction continues and additional projects enter the operational phase. The impact of noise produced by wind farms can occur during construction, operation, maintenance, and decommissioning.

Of the studies performed to assess these impacts, construction noise, specifically pile driving, has produced high levels of sound pressure and acoustic particle motion in the water column and seabed (Nedwell and Howell, 2004; Thomsen et al., 2006; Tougaard et al., 2012). During pile driving for offshore wind construction, the broadband peak sound pressure level has been measured at 189 dB at 400 m and a modeled level of 228 dB at 1m with a dominant frequency of 315 Hz, however these levels depend on the size of the piles (Thomsen et al., 2006; Tougaard et al., 2012). These noise levels are within the perception ranges of Atlantic cod *Gadus morhua*, dab *Limanda limanda*, Atlantic salmon *Salmo salar*, and Atlantic herring *Clupea harengu*s (Thomsen et al., 2006). Documented behavioral reactions in Atlantic cod and sole *Solea solea* were observed up to tens of kilometers from the source (Andersson, 2011).

Planned wind turbine generator capacities are increasing, which will require ever larger pile sizes. Alternative foundation types such as gravity based or suction buckets reduce installation noise substantially, but these are less commonly proposed for U.S. east coast projects. To date, most offshore wind installations worldwide have used fixed turbines. Floating offshore wind technology, which will have substantially reduced installation noise and is required for deeper waters, is in its nascent stages (although sites that would require floating technology have been leased along the U.S. west coast) and thus little is known about differences in operational noise between floating and fixed turbines. There is some evidence that jacketing monopile turbines reduces the chronic noise from operation (Thomsen et al., 2015), however to date, actual noise levels emitted by floating platforms has not been documented. As this technology advances, there is a need to determine the noise levels and frequencies which different floating platform types emit and at what distances.

Operational noise at offshore wind farms includes sound produced by both the turbines (Tougaard et al., 2020) and increased vessel traffic (Nedwell and Howell, 2004). Underwater sound produced by turbine operation is generated by the moving mechanical parts within the nacelle (i.e., turbine housing) as well as possible wind-induced vibration of the tower (Tougaard et al. 2020). Operational noise of a 1.5MW turbine (at 110m distance) has been measured between 120 – 142 dB with dominant frequencies at 50, 160, and 200 Hz at wind speeds of 12 m/s (Thomsen et al., 2006). Distance from the noise source, wind speed, and turbine size all impact noise levels measured during turbine operation (Tougaard et al. 2020). Also, vessel noise in the Tougaard et al. (2020) analysis was louder than that of turbines, but distance from the noise source varied as did turbine size (max turbine size was 6MW). Noise produced during wind turbine operation was found to be detectable at a distance of several kilometers by fishes sensitive to sound pressure, however species sensitive to motion (as opposed to pressure) were found to be affected within only tens of meters (Andersson, 2011). It is estimated that operational noise of wind turbines is within the perception range of Atlantic cod and herring up to a distance of approximately 4 km, while for dab and Atlantic salmon up to 1 km (Thomsen et al., 2006).

Oil, Gas, and Mineral Extraction

Some of the loudest anthropogenic noises are generated by marine extraction industries such as oil drilling and mineral mining (Stocker, 2002). The most common source of sounds is from air guns used to create and read seismic disturbances (Hawkins and Popper, 2016; Popper et al., 2014, 2005; Popper and Hastings, 2009). Air guns are used to generate and direct huge impact noises into the ocean substrate. The sound pressure wave created aids in reflection profiling of underlying substrates for oil and gas exploration. Peak source sound levels typically are 250-255 dB. Following the exploration stage; drilling, coring, and dredging are performed during extraction.

Resource extraction in marine waters produces chronic noise disturbance including from vessel noise (the impacts of vessel noise are described above); noise is also produced by the operation of extraction machinery, depending on platform type. Spence (2007) reviewed research on noise generated by oil and gas extraction found that fixed platforms had lower underwater radiated noise levels than floating platforms, and gravel islands appear to have the lowest source levels of any oil and gas industry activity. Semisubmersible platforms were found to generate the most underwater noise, which was highest when thrusters were operating and drilling was occurring. Levels were measured at 20-50+ dB in the frequency range of 20 – 1000 Hz during drilling operations, with the dominant frequencies at 130, 200, 350, and 600 Hz (Spence, 2007). On all platform types, noise from large power generation equipment is likely to be a dominant cause of underwater noise, for example from the operation of turbines, compressors, and large pumps (e.g., mud pumps). This noise is

thought to be more significant when equipment is hard mounted directly to the platform (Spence, 2007).

Coastal and Marine Construction

Inshore industrial and construction activities drastically alter the aquatic soundscape and have caused documented mortality and severe behavioral change in fishes and other marine animals. Underwater blasting with explosives is sometimes used for dredging new navigation channels in rocky substrates, decommissioning and removing bridge structures and dams, and construction of new in-water structures such as gas and oil pipelines, bridges, and dams. The potential for injury and death to fish from underwater explosives has been well-documented (Hubbs and Rechnitzer, 1952; Keevin et al., 1999; Linton et al., 1985; Teleki and Chamberlain, 1978). Moreover, some construction (including that related to offshore wind) requires pile driving. This typically occurs at frequencies below 1000 Hz, and has been documented to cause negative or disruptive physiological and behavioral effects on fish (Mueller-Blenkle et al., 2010), including Atlantic cod (Thomsen et al., 2012) and sturgeons (Popper and Calfee, 2023).

IV. Impacts of anthropogenic noise on fishes

Sound energy is transmitted through both sound pressure and water particle motion. Thus, to understand whether and how noises are likely to impact fishes, it is necessary to understand their sensitivity to both sound pressure and particle motion. Fishes have very complex and diverse interactions with sound and how they perceive it. Hearing systems and capabilities vary based on anatomy, including presence of a swim bladder or other gas-filled organs and position relative to the inner ear, as well as other factors (Popper and Hawkins, 2018). Sensitivity varies by species and among larval, juvenile, and adult stages (Wright et al., 2010). Many species have the same hearing frequency sensitivity that humans do (10 to 20,000 Hz; (Fay, 2009; Fine, 1977a; Popper and Fay, 2011; Popper and Hastings, 2009; Tavolga, 1960, 1980), and most fish produce sounds below 200,000 Hz (Fay, 2009; Fine, 1977a; Tavolga, 1960, 1980). Sound frequencies below 100,000 Hz scatter and dissipate least, travel farthest underwater (Au and Hastings, 2008; Popper and Fay, 2011; Wenz, 1962), and are used for communication among fishes (Au and Hastings, 2008; Bass et al., 1997; Popper and Fay, 2011). Certain groups of fish, such as *Clupeidae* (herrings, shad, sardines, and menhaden), can detect ultrasound frequencies above 100,000 Hz (Fine, 1977b; Mann et al., 2001, 1997; Narins et al., 2013; Nestler et al., 1992), however the strongest response has been documented at 40,000 Hz (Wilson et al., 2009).

The frequency at which different species perceive sound is highly variable (Monczak et al., 2017), however for most fishes, sound production and habitat soundscape acoustic

signatures are at frequencies below 5,000 Hz (Fish and Mowbray, 1970; Myrberg and Fuiman, 2002). For example, black drum (*Pogonias cromis*) were found to have the highest neurological response to sounds at 82, 166, and 249 Hz (Monczak et al., 2017). This is also the range of frequencies where underwater sound propagates best. Most human-generated chronic noise is below 5,000 Hz (Au and Hastings, 2008; Richardson et al., 2013), which is of concern as fish are very sensitive to intense sounds below 1,000 Hz.

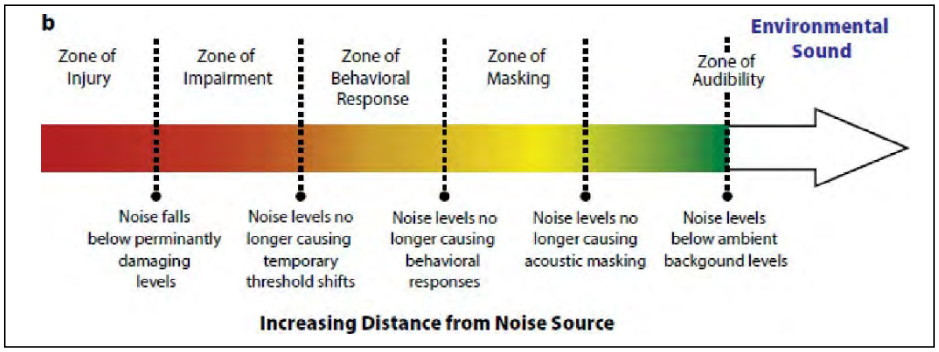

Figure 2. The potential effects of noise with distance from source. Generally, noise and impact on individual animals may be greater closer to the source. Effects change with increasing distance from the source because acoustic signals change, for example decreased dB. Figure from Mooney et al. 2012, modified from Dooling and Blumenrath (2013).

Particle Motion versus Sound Pressure

Although there is growing evidence that fish and invertebrates are sensitive to the particle motion caused by underwater noise (Casper and Popper, 2010; Hawkins and Popper, 2017; Mooney et al., 2020, p. 201; Mueller-Blenkle et al., 2010; Nedelec et al., 2016; Popper and Hawkins, 2018; Solé et al., 2017), particle motion itself is technically challenging to measure. This difficulty has led to poor assessments of the impacts of particle motion on fish and invertebrates (Popper and Hawkins, 2018). There is more information and research on effects of sound pressure in bony fishes and to a lesser extent invertebrates. As such, much of the information below describes the impact of sound pressure.

Physiological Effects

Physiological impacts of sound to fish include damage to ear, nerve, and lateral line tissue that can lead to sound sensing loss or threshold shifts in hearing (Hastings and Popper, 2005; Heathershaw et al., 2001; Jasny, 1999). Threshold shifts result from exposure to low levels of sound for a relatively long period of time or high levels of sound for shorter periods, which may be temporary or permanent. Recovery from threshold shifts appears to require more time for fish species that vocalize (Amoser and Ladich, 2003). Threshold shifts can impact a fish's ability to carry out its life functions. Any organ with a markedly different density than seawater (e.g., swim bladder) may be susceptible to pressure-related impacts. Some of the

resulting effects on fish include rupturing of organs and death (Hastings and Popper, 2005).

Near field (close proximity) percussion events produced by pile driving and explosions can have a lethal impact on fish through particle motion and sound wave compression. However, the distance from the disturbance and environmental setting (water density, turbulence, etc.) undoubtedly has major influences on potential physiological effects from particle motion and need further study before they can be treated in detail (Keevin et al., 1999; Thomsen et al., 2015). The lethality of underwater blasts on fish is dependent upon the intensity of the explosion; however, a number of other variables may play an important role including the size, shape, species, and orientation of the organism to the shock wave; the amount, type, and detonation depth of explosive; water depth; and bottom type (Linton et al., 1985).
Fish with swim bladders are the most susceptible to underwater blasts due to the effects of rapid changes in hydrostatic pressures on this gas-filled organ. The kidney, liver, spleen, and sinus structures are other organs typically injured after underwater blasts (Linton et al., 1985). Smaller fish are more likely to be impacted by the shock wave of underwater blasts than are larger fish, and eggs and embryos tend to be particularly sensitive (Wright and Hopky, 1998). However, early fish larvae tend to be less sensitive to blasts than eggs or post-larval fish, probably because the larval stages do not yet possess swim bladders (Wright and Hopky, 1998). Cephalopods can experience significant trauma to their statocysts, structures necessary for balance and position, at cellular and subcellular levels (André et al., 2011). Additionally, playback of seismic air gun recordings induced delayed development and malformation of New Zealand scallop larvae (De Soto et al., 2013).

Effect of anthropogenic noise on zooplankton is a relatively recent topic of interest, tangential to the main subject of the paper but relevant as physiological impacts to zooplankton indirectly affect fishes since many species feed on zooplankton. Abundance of dead larval and adult zooplankton increases two to threefold within one hour after passage of an active seismic air gun; elevated mortality extended at least 1.2 km from the air gun signal (McCauley et al., 2017). Simulations based on these findings estimate a 22% reduction of zooplankton population within the survey area and declining to 14% within 15 km and 2% within 150 km (Richardson et al., 2017, p. 201). In contrast, the copepod *Calanus finmarchicus* was only negatively affected when in close proximity (≤ 10 m) to an active seismic air gun (Fields et al., 2019).

Anthropogenic noise that falsely trigger fish responses may cause animals to expend energy without benefit (Stocker, 2002). Masking biologically significant sounds may compromise feeding, spawning, community bonding, and schooling synchronization. For species in which males broadcast calls to attract females to a spawning location (e.g., oyster toadfish *Opsanus tau*, silver perch *Bairdiella chrysoura*, black drum *Pogonias cromis*, spotted

seatrout *Cynoscion nebulosus*, red drum *Sciaenops ocellatus*), masking of these acoustic signals by noise may interfere with reproduction (Smott et al., 2018). Further, the effect of noise on each of these behaviors is compounded when considering that the behaviors are inter-related; for example, a change in the ability or desire to feed compounded with reduced communication may lead to a more severe reduction in spawning success.

Behavioral response of fishes to noise is varied and dependent on the species sound perception and the characteristics of the source of noise. While not a comprehensive list, the following provide some examples of behavioral responses.

- When exposed to noise from piling installation, Atlantic cod initially responded by freezing in place. Following the initial onset of noise, Atlantic cod and sole increased swimming speed for the duration of the piling installation activity. In contrast, other fish species appeared to habituate to the repetitive noise (Andersson, 2011).
- Elasmobranch species that are more active swimmers appear to be more sensitive to sound than more sedentary species. Elasmobranchs have been shown to be sound curious, often seeking out the source. Sudden noises that are ~20-30 dB above ambient sound can induce a startle response, but habituation over time has been known to occur (Casper and Popper, 2010).
- Turbine and tidal turbine noise can obscure sounds associated with mudflats resulting in delayed metamorphosis of estuarine crabs (Carroll et al., 2017).
- Increased ambient noise created by watercraft activity potentially reduces the ability of marine organisms, particularly larval forms, to receive the appropriate sound cues to settle in critical habitats (Hastings and Popper, 2005; Holles et al., 2013; Jasny, 1999; Lillis et al., 2016; Scholik and Yan, 2002; Simpson et al., 2016; Staaterman et al., 2014; Stanley et al., 2012).

Cumulative Effects

The most chronic and pervasive impacts on regional fish stocks occur when human generated sounds cause behavioral changes that affect critical life history activities required to maintain healthy populations. Several studies have indicated that increased background noise and sudden increases in sound pressure can lead to elevated levels of stress in many fish species (Hastings and Popper, 2005). Chronic noise levels ≥123 dB can elicit physiological (weight loss, decreased condition, and elevated and variable heterophil:lymphocyte ratio), behavioral (increased piping and tail adjustments and reduced stationarity), and vocal (increased clicking) stress responses in the lined seahorse *Hippocampus erectus* (Andersson, 2011). Similarly, Southern Australia scallops *Pecten fumatus* exposed to seismic air gun signals resulted in altered physiology (hemolymph biochemistry) and behavior (development of a flinch response and increased recessing

reflex) which intensified with repeated exposure (Day et al., 2017).

These examples, as well as others described in this report, demonstrate that noise impacts key life events (e.g., foraging, navigation, and spawning) in many species. This can produce cumulative impacts at many scales. For instance, individual animals that experience repeat exposure to acute noise impacts or experience chronic noise are most likely to have cumulative physiological impacts that reduce their individual fitness. Yet, population level impacts may occur if the acute or chronic noise impacts spawning aggregations or behavior over multiple occasions or locations. Either of these scenarios could lead to population level effects over time if, for example, spawning success or aggregations are interrupted. Examining these cumulative impacts at a range of scales is a priority for future research, especially as sound-producing ocean uses – including offshore wind construction – continue to intensify.

Effects on Biogenic Habitats

Alteration of the soundscape has the potential to impact biogenic fish habitats. Eastern oyster *Crassostrea virginica* larval settlement increased in the presence of oyster reef habitat sounds (Lillis et al., 2013). In response to sediment vibrations, blue mussel *Mytilus edulis* respiration rates decreased resulting in altered valve gape, oxygen demand, and waste removal (Roberts et al., 2015). Unlike shellfish, Scleractinian corals appear resistant to soft tissue and skeletal damage after repeated exposure to a 3D seismic survey (Heyward et al., 2018). Seagrass meadows, which provide not only a structural habitat for species to forage and avoid predators, but also act as an acoustic refuge for prey species including fishes by attenuating high frequency sounds (100,000 Hz) such as those used by bottlenose dolphin *Tursiops truncatus* (Wilson et al., 2013), may be impacted by noise. Submerged aquatic vegetation exposed to low frequency sounds (50-400 Hz at 157 ± 5 dB re 1 μPa^2) can develop physical damage to root and rhizome cellular structures, specifically amyloplasts responsible for starch production and storage, gravity sensing, and vibration reception (Solé et al., 2021).

Effects on Fisheries Catch Rates

Anthropogenic noise has been demonstrated to affect catch rates. Several studies indicate that catch rates of fishes decreased in areas exposed to seismic air gun blasts (Engås et al., 1996; Hastings and Popper, 2005); abundance and catch rates for Atlantic cod *Gadus morhua* and haddock *Melanogrammus aeglefinus* did not return to pre-disturbance levels during the five-day monitoring period (Engås et al., 1996). These results imply that fish relocate to areas beyond the impact zone (area of highest sound intensity), which have been corroborated with visual studies on fish abundance before and after seismic surveys (Paxton et al., 2017). One study indicated that catch rates increased 30-50 km away from the noise source, implying

that redistribution of fish populations may occur over broad areas (Hastings and Popper, 2005). Seismic surveys may have positive, no change, or negative effect on fishery catch rates due to variable responses among fish species such as no response, dispersal, avoidance, and decreased responsiveness to bait (Carroll et al., 2017). While fish abundance can decrease due to increased anthropogenic noise, such as from wind farm operation, it is unclear the extent to which the increased noise from wind farm operation affects individual behaviors (Mooney et al., 2020).

V. Mitigation

When noise cannot be avoided, measures could be implemented to mitigate certain anthropogenic acoustic impacts. New technologies continue to emerge that reduce vessel noise, rendering them less acoustically intrusive. For instance, the use of alternative propeller designs and propulsion systems such as diesel-electric hybrid, electric motors, liquid natural gas pumps, and rotor sails that are quieter than internal combustion engines can be employed. Ship generators are also a substantial source of vessel noise. Insulated or sound proofed ship hulls may be used aboard ships with generators to further reduce acoustic impacts. Furthermore, when in port, vessels could power down their generators and connect to onshore power systems when possible.

In addition to modifying hardware and ship practices, informed marine spatial planning can be used to manage location and timing of when harmful sounds are generated. Acoustic transects can be used to isolate and map specific sites based on sound production of fishery aggregations (Gilmore et al., 2003; Gilmore Jr, 1994; Luczkovich et al., 1999; Rountree et al., 2002) as well as the broader ambient soundscape (Chou et al., 2021). For example, critical spawning and aggregation sites can be designated as off limits to vessels, dredging, seismic, construction, and other sound generating activities at night which is when spawning chorus events typically occur. These sites can be remotely monitored with vessel tracking technologies such as automatic identification systems (AIS) to identify violating vessels. To mitigate episodic noise impacts, such as from offshore construction, seasonal restrictions on activities could be combined with spatial planning.

Novel seismic survey methods, including higher sensitivity hydrophones, benthic stationary fiber-optic receivers, parabolic reflectors, and non-impulsive, very low frequency marine vibroseis, may reduce the potential detriment caused by these activities (Chou et al., 2021). Continued study of these technologies and their relative impact on marine life should be prioritized.

The construction of some infrastructure types, including offshore wind turbine foundations,

generally involves pile driving at present. However, other foundation types including "quiet" technologies such as pulse prolongation, vibropiling, foundation drilling, gravity base foundation, suction bucket jacket, mono bucket foundation, and floating foundations, are all potentially viable alternatives (Koschinski and Lüdemann, 2020). When possible, one or more sound dampening measures such as bubble curtains, isolation casings, hydro sound dampers, dewatered cofferdams, and double/mandrel piles should be used in conjunction with pile driving.

Multiple sound exposure level metrics such as cumulative, peak, single-strike, and number of strikes should be considered when evaluating the potential effect of pile driving and other impulsive sounds and establishing allowable exposure criteria (Halvorsen, 2011). Furthermore, deterrence strategies such as soft-start and ramp-up are intended to scare away mobile species as noise levels are gradually increased (Andersson, 2011; Chou et al., 2021). Each of these are areas for continued research to better inform best practices, exposure criteria, and noise thresholds.

VI. Data gaps and research needs

There are still many unknowns about the impact of anthropogenic noise on the physiology and behavior of fishes. Some of these include species-specific effects, the impact on fishing catch rates, synergistic impacts of multiple sources of anthropogenic noise, and many other questions. In 2020, the New York State Energy Research and Development Authority (NYSERDA) convened a working group of over 40 stakeholders and experts who identified and prioritized data gaps and research needs specific to the effects of sound and vibration on fishes and invertebrates (Popper et al., 2021). We direct the reader to this document for more information on research needs.

References

Amoser, S., Ladich, F., 2003. Diversity in noise-induced temporary hearing loss in otophysine fishes. The Journal of the Acoustical Society of America 113, 2170–2179. https://doi.org/10.1121/1.1557212

Andersson, M.H., 2011. Offshore wind farms-ecological effects of noise and habitat alteration on fish.

André, M., Solé, M., Lenoir, M., Durfort, M., Quero, C., Mas, A., Lombarte, A., Van Der Schaar, M., López-Bejar, M., Morell, M., Zaugg, S., Houégnigan, L., 2011. Low-frequency sounds induce acoustic trauma in cephalopods. Frontiers in Ecology & Environment 9, 489–493. https://doi.org/10.1890/100124

Au, W.W.L., Hastings, M.C., 2008. Principles of Marine Bioacoustics. Springer US, New York,

NY. https://doi.org/10.1007/978-0-387-78365-9

Bass, A.H., Bodnar, D.A., McKibben, J.R., 1997. From neurons to behavior: vocal-acoustic communication in teleost fish. The Biological Bulletin 192, 158–160. https://doi.org/10.2307/1542593

Buscaino, G., Filiciotto, F., Buffa, G., Di Stefano, V., Maccarrone, V., Buscaino, C., Mazzola, S., Alonge, G., D'Angelo, S., Maccarrone, V., 2012. The underwater acoustic activities of the red swamp crayfish *Procambarus clarkii*. The Journal of the Acoustical Society of America 132, 1792–1798. https://doi.org/10.1121/1.4742744

Carroll, A., Przeslawski, R., Duncan, A., Gunning, M., Bruce, B., 2017. A critical review of the potential impacts of marine seismic surveys on fish & invertebrates. Marine Pollution Bulletin 114, 9–24.

Casper, B.M., Popper, A.N., 2010. Anthropogenic noise: Is this an issue for elasmobranch fishes? The Journal of the Acoustical Society of America 127, 1753–1753. https://doi.org/10.1121/1.3383688

Chou, E., Southall, B.L., Robards, M., Rosenbaum, H.C., 2021. International policy, recommendations, actions and mitigation efforts of anthropogenic underwater noise. Ocean & Coastal Management 202, 105427.

Chow, J., Kopp, R.J., Portney, P.R., 2003. Energy resources and global development. Science 302, 1528–1531.

Day, R.D., McCauley, R.D., Fitzgibbon, Q.P., Hartmann, K., Semmens, J.M., 2017. Exposure to seismic air gun signals causes physiological harm and alters behavior in the scallop *Pecten fumatus*. Proceedings of the National Academy of Science U.S.A. 114. https://doi.org/10.1073/pnas.1700564114

De Soto, N.A., Delorme, N., Atkins, J., Howard, S., Williams, J., Johnson, M., 2013. Anthropogenic noise causes body malformations and delays development in marine larvae. Scientific Reports 3, 2831. https://doi.org/10.1038/srep02831

Dincer, I., 1999. Environmental impacts of energy. Energy policy 27, 845–854.

Duarte, C.M., Chapuis, L., Collin, S.P., Costa, D.P., Devassy, R.P., Eguiluz, V.M., Erbe, C., Gordon, T.A.C., Halpern, B.S., Harding, H.R., Havlik, M.N., Meekan, M., Merchant, N.D., Miksis-Olds, J.L., Parsons, M., Predragovic, M., Radford, A.N., Radford, C.A., Simpson, S.D., Slabbekoorn, H., Staaterman, E., Van Opzeeland, I.C., Winderen, J., Zhang, X., Juanes, F., 2021. The soundscape of the Anthropocene ocean. Science 371, eaba4658. https://doi.org/10.1126/science.aba4658

Engås, A., Løkkeborg, S., Ona, E., Soldal, A.V., 1996. Effects of seismic shooting on local abundance and catch rates of cod (*(Gadus morhua)* and haddock *)(Melanogrammus aeglefinus)*. Canadian Journal of Fisheries and Aquatic Sciences 53, 2238–2249. https://doi.org/10.1139/f96-177

Fay, R., 2009. Soundscapes and the sense of hearing of fishes. Integrative Zoology 4, 26–32.

https://doi.org/10.1111/j.1749-4877.2008.00132.x
Fields, D.M., Handegard, N.O., Dalen, J., Eichner, C., Malde, K., Karlsen, Ø., Skiftesvik, A.B., Durif, C.M.F., Browman, H.I., 2019. Airgun blasts used in marine seismic surveys have limited effects on mortality, and no sublethal effects on behaviour or gene expression, in the copepod *Calanus finmarchicus*. ICES Journal of Marine Science 76, 2033–2044. https://doi.org/10.1093/icesjms/fsz126
Fine, M.L., 1977a. Communication in fishes: How animals communicate, pp. 472–518.
Fine, M.L., 1977b. Temporal aspects of calling behavior in oyster toadfish, *Opsanus-tau*. Fishery Bulletin 75, 871.
Fine, M.L., Parmentier, E., 2015. Mechanisms of fish sound production, in: ladich, f. (ed.), sound communication in fishes, animal signals and communication. Springer Vienna, Vienna, pp. 77–126. https://doi.org/10.1007/978-3-7091-1846-7_3
Fish, M.P., Kelsey Jr, A.S., Mowbray, W.H., 1952. Studies on the production of underwater sound by North Atlantic coastal fishes.
Fish, M.P., Mowbray, W.H., 1970. Sounds of western North Atlantic fishes: A reference file of biological underwater sounds. Johns Hopkins Press Baltimore.
Gilmore, G.R., Clark, A.M., Cooke, J., 2003. Technologies for sustained biological resource observations with potential applications in coastal homeland security. Marine Technology Society Journal 37, 134–141. https://doi.org/10.4031/002533203787537159
Gilmore Jr, R., 1994. Environmental parameters associated with spawning, larval dispersal, and early life history of the spotted seatrout, *Cynoscion nebulosus* (Cuvier), Final Program Review Contract No. LCD 347.
Gimpel, A., Werner, K., Bockelmann, F.-D., Haslob, H., Kloppmann, M., Schaber, M., Stelzenmüller, V., 2023. Ecological effects of offshore wind farms on Atlantic cod (*Gadus morhua*) in the southern North Sea. Science of the Total Environment 878, 162902.
Halvorsen, M.B., 2011. Hydroacoustic impacts on fish from pile installation. Transportation Research Board.
Hastings, M.C., Popper, A.N., 2005. Effects of sound on fish. California Department of Transportation.
Hawkins, A.D., Popper, A.N., 2017. A sound approach to assessing the impact of underwater noise on marine fishes and invertebrates. ICES Journal of Marine Science 74, 635–651. https://doi.org/10.1093/icesjms/fsw205
Hawkins, A.D., Popper, A.N., 2016. Developing sound exposure criteria for fishes, in: Popper, A.N., Hawkins, A. (Eds.), The effects of noise on aquatic life II: Advances in experimental medicine and biology. Springer New York, New York, NY, pp. 431–439. https://doi.org/10.1007/978-1-4939-2981-8_51

Heathershaw, A., Ward, P., David, A., 2001. The environmental impact of underwater sound.

Proceedings-Institute of Acoustics 23, 1–12.
Heyward, A., Colquhoun, J., Cripps, E., McCorry, D., Stowar, M., Radford, B., Miller, K., Miller, I., Battershill, C., 2018. No evidence of damage to the soft tissue or skeletal integrity of mesophotic corals exposed to a 3D marine seismic survey. Marine Pollution Bulletin 129, 8–13. https://doi.org/10.1016/j.marpolbul.2018.01.057
Hildebrand, J.A., 2005. Impacts of anthropogenic sound. Marine mammal research: conservation beyond crisis 101–124.
Holles, S., Simpson, S., Radford, A., Berten, L., Lecchini, D., 2013. Boat noise disrupts orientation behaviour in a coral reef fish. Marine Ecological Progress Series 485, 295–300. https://doi.org/10.3354/meps10346
Hubbs, C.L., Rechnitzer, A.B., 1952. Report on experiments designed to determine effects of underwater explosions on fish life. California Fish and Game 38, 333–366.
Hughes, A.R., Mann, D.A., Kimbro, D.L., 2014. Predatory fish sounds can alter crab foraging behaviour and influence bivalve abundance. Proceedings of the Royal Society B. 281, 20140715. https://doi.org/10.1098/rspb.2014.0715
Janik, V.M., 2014. Cetacean vocal learning and communication. Current Opinion in Neurobiology 28, 60–65. https://doi.org/10.1016/j.conb.2014.06.010
Jasny, M., 1999. Sounding the depths: Supertankers, sonar, and the rise of undersea noise. Natural Resources Defense Council.
Johnston, C.E., Phillips, C.T., 2003. Sound production in sturgeon *Scaphirhynchus albus* and *S. platorynchus (Acipenseridae)*. Environmental Biology of Fishes 68, 59–64.
Keevin, T., Gaspin, J., Gitschlag, G., Hempen, G., Linton, T., Smith, M., 1999. Twenty-fifth annual conference on explosives and blasting technique.
Koschinski, S., Lüdemann, K., 2020. Noise mitigation for the construction of increasingly large offshore wind turbines: Technical Options for complying with noise limits; The Federal Agency for Nature Conservation: Isle of Vilm, Germany.
Ladich, F., 1997. Agonistic behaviour and significance of sounds in vocalizing fish. Marine and Freshwater Behaviour and Physiology 29, 87–108. https://doi.org/10.1080/10236249709379002
Lamml, M., Kramer, B., 2005. Sound production in the reproductive behaviour of the weakly electric fish *Pollimyr us marianne* Kramer et al. 2003 (M*ormyridae*, Teleostei). Bioacoustics 15, 51–78. https://doi.org/10.1080/09524622.2005.9753538
Lillis, A., Bohnenstiehl, D., Peters, J.W., Eggleston, D., 2016. Variation in habitat soundscape characteristics influences settlement of a reef-building coral. PeerJ Life and Environment 4, e2557. https://doi.org/10.7717/peerj.2557
Lillis, A., Eggleston, D.B., Bohnenstiehl, D.R., 2013. Oyster Larvae Settle in Response to Habitat-Associated Underwater Sounds. PLoS ONE 8, e79337. https://doi.org/10.1371/journal.pone.0079337
Linton, T., Landry Jr, A., Buckner Jr, J., Berry, R., 1985. Effects upon selected marine organisms

of explosives used for sound production in geophysical exploration.
Løkkeborg, S., Ona, E., Vold, A., Salthaug, A., 2012. Sounds from seismic air guns: Gear- and species-specific effects on catch rates and fish distribution. Canadian Journal of Fisheries and Aquatic Sciences 69, 1278–1291. https://doi.org/10.1139/f2012-059
Luczkovich, J.J., Sprague, M.W., Johnson, S.E., Pullinger, R.C., 1999. Delimiting spawning areas of weakfish *Cynoscion regalis* (Family Sciaenidae) in Pamlico Sound, North Carolina using passive hydroacoustic surveys. Bioacoustics 10, 143–160. https://doi.org/10.1080/09524622.1999.9753427
Mann, D.A., Bowers-Altman, J., Rountree, R.A., 1997. Sounds produced by the striped cusk-eel *Ophidion marginatum* (*Ophidiidae*) during courtship and spawning. Copeia 1997, 610. https://doi.org/10.2307/1447568
Mann, D.A., Higgs, D.M., Tavolga, W.N., Souza, M.J., Popper, A.N., 2001. Ultrasound detection by clupeiform fishes. The Journal of the Acoustical Society of America 109, 3048–3054. https://doi.org/10.1121/1.1368406
Martin, B., Zeddies, D., MacDonnell, J., Vallarta, J., Delarue, J., 2014. Characterization and potential impacts of noise producing construction and operation activities on the outer continental shelf: data synthesis.
Maruska, K.P., Mensinger, A.F., 2009. Acoustic characteristics and variations in grunt vocalizations in the oyster toadfish *Opsanus tau.* Environmental Biology of Fishes 84, 325–337. https://doi.org/10.1007/s10641-009-9446-y
Maruska, K.P., Ung, U.S., Fernald, R.D., 2012. The African cichlid fish *Astatotilapia burtoni* uses acoustic communication for reproduction: Sound production, hearing, and behavioral significance. PLoS ONE 7, e37612. https://doi.org/10.1371/journal.pone.0037612
McCauley, R.D., Day, R.D., Swadling, K.M., Fitzgibbon, Q.P., Watson, R.A., Semmens, J.M., 2017. Widely used marine seismic survey air gun operations negatively impact zooplankton. Nature Ecology and Evolution 1, 0195. https://doi.org/10.1038/s41559-017-0195
Monczak, A., Berry, A., Kehrer, C., Montie, E.W., 2017. Long-term acoustic monitoring of fish calling provides baseline estimates of reproductive timelines in the May River estuary, southeastern USA. Marine Ecology Progress Series 581, 1–19.

Montie, E.W., Hoover, M., Kehrer, C., Yost, J., Brenkert, K., O'Donnell, T., Denson, M.R., 2017. Acoustic monitoring indicates a correlation between calling and spawning in captive spotted seatrout (*Cynoscion nebulosus*). PeerJ Life and Environment 5, e2944. https://doi.org/10.7717/peerj.2944

Mooney, A., Andersson, M., Stanley, J., 2020. Acoustic impacts of offshore wind energy on

fishery resources: An evolving source and varied effects across a wind farm's lifetime. Oceanography 33, 82–95. https://doi.org/10.5670/oceanog.2020.408

Mueller-Blenkle, C., McGregor, P.K., Gill, A.B., Andersson, M.H., Metcalfe, J., Bendall, V., Sigray, P., Wood, D.T., Thomsen, F., 2010. Effects of pile-driving noise on the behaviour of marine fish.

Myrberg, A.A., Fuiman, L.A., 2002. The sensory world of coral reef fishes. Coral reef fishes: Dynamics and diversity in a complex ecosystem 123–148.

Narins, P.M., Wilson, M., Mann, D.A., 2013. Ultrasound detection in fishes and frogs: Discovery and mechanisms, in: Köppl, C., Manley, G.A., Popper, A.N., Fay, R.R. (Eds.), Insights from comparative hearing research, springer handbook of auditory research. Springer New York, New York, NY, pp. 133–156. https://doi.org/10.1007/2506_2013_29

Nedelec, S.L., Mills, S.C., Lecchini, D., Nedelec, B., Simpson, S.D., Radford, A.N., 2016. Repeated exposure to noise increases tolerance in a coral reef fish. Environmental Pollution 216, 428–436.

Nedwell, J., Howell, D., 2004. A review of offshore windfarm related underwater noise sources. Collaborative Offshore Wind Energy Research into the Environment (COWRIE) Report 544, 1–57.

Nestler, J.M., Ploskey, G.R., Pickens, J., Menezes, J., Schilt, C., 1992. Responses of blueback herring to high-frequency sound and implications for reducing entrainment at hydropower dams. North American Journal of Fisheries Management 12, 667–683.

Nowacek, D.P., Thorne, L.H., Johnston, D.W., Tyack, P.L., 2007. Responses of cetaceans to anthropogenic noise. Mammal Review 37, 81–115. https://doi.org/10.1111/j.1365-2907.2007.00104.x

Paxton, A.B., Taylor, J.C., Nowacek, D.P., Dale, J., Cole, E., Voss, C.M., Peterson, C.H., 2017. Seismic survey noise disrupted fish use of a temperate reef. Marine Policy 78, 68–73.

Payne, J., Andrews, C., Fancey, L., Cook, A., Christian, J.R., 2007. Pilot study on the effects of seismic air gun noise on lobster *(Homarus americanus)*.

Pelc, R., Fujita, R.M., 2002. Renewable energy from the ocean. Marine policy 26, 471–479.

Peña, H., Handegard, N.O., Ona, E., 2013. Feeding herring schools do not react to seismic air gun surveys. ICES Journal of Marine Science 70, 1174–1180. https://doi.org/10.1093/icesjms/fst079

Peng, C., Zhao, X., Liu, G., 2015. Noise in the Sea and Its Impacts on Marine Organisms. International Journal of Environmental Research and Public Health 12, 12304–12323. https://doi.org/10.3390/ijerph121012304

Pijanowski, B.C., Villanueva-Rivera, L.J., Dumyahn, S.L., Farina, A., Krause, B.L., Napoletano, B.M., Gage, S.H., Pieretti, N., 2011. Soundscape ecology: The science of sound in the landscape. BioScience 61, 203–216. https://doi.org/10.1525/bio.2011.61.3.6

Pimentel, D., Herz, M., Glickstein, M., Zimmerman, M., Allen, R., Becker, K., Evans, J.,

Hussain, B., Sarsfeld, R., Grosfeld, A., 2002. Renewable energy: Current and potential issues: Renewable energy technologies could, if developed and implemented, provide nearly 50% of US energy needs; this would require about 17% of US land resources. Bioscience 52, 1111–1120.

Popper, A., Hice-Dunton, L., Williams, K., Jenkins, E., 2021. Workgroup report on sound and vibration effects on fishes and aquatic invertebrates for the State of the Science Workshop on Wildlife and Offshore Wind Energy 2020: Cumulative Impacts. 10.13140/RG.2.2.13130.49609.

Popper, A.N., Calfee, R.D., 2023. Sound and sturgeon: Bioacoustics and anthropogenic sound. The Journal of the Acoustical Society of America 154, 2021–2035.

Popper, A.N., Fay, R.R., 2011. Rethinking sound detection by fishes. Hearing Research 273, 25–36. https://doi.org/10.1016/j.heares.2009.12.023

Popper, A.N., Hastings, M.C., 2009. The effects of anthropogenic sources of sound on fishes. Journal of Fish Biology 75, 455–489. https://doi.org/10.1111/j.1095-8649.2009.02319.x

Popper, A.N., Hawkins, A.D., 2018. The importance of particle motion to fishes and invertebrates. The Journal of the Acoustical Society of America 143, 470–488. https://doi.org/10.1121/1.5021594

Popper, A.N., Hawkins, A.D., Fay, R.R., Mann, D.A., Bartol, S., Carlson, T.J., Coombs, S., Ellison, W.T., Gentry, R.L., Halvorsen, M.B., Løkkeborg, S., Rogers, P.H., Southall, B.L., Zeddies, D.G., Tavolga, W.N., 2014. Introduction, in: ASA S3/SC1.4 TR-2014 Sound exposure guidelines for fishes and sea turtles: A technical report prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI, SpringerBriefs in Oceanography. Springer International Publishing, Cham, pp. 1–3. https://doi.org/10.1007/978-3-319-06659-2_1

Popper, A.N., Smith, M.E., Cott, P.A., Hanna, B.W., MacGillivray, A.O., Austin, M.E., Mann, D.A., 2005. Effects of exposure to seismic airgun use on hearing of three fish species. The Journal of the Acoustical Society of America 117, 3958–3971. https://doi.org/10.1121/1.1904386

Putland, R.L., Mackiewicz, A., Mensinger, A.F., 2018. Localizing individual soniferous fish using passive acoustic monitoring. Ecological Informatics 48, 60–68.

Radford, C., Tindle, C., Montgomery, J., Jeffs, A., 2011. Modelling a reef as an extended sound source increases the predicted range at which reef noise may be heard by fish larvae. Marine Ecology Progress Series Ser. 438, 167–174. https://doi.org/10.3354/meps09312

Remage-Healey, L., Nowacek, D.P., Bass, A.H., 2006. Dolphin foraging sounds suppress calling and elevate stress hormone levels in a prey species, the Gulf toadfish. Journal of Experimental Biology 209, 4444–4451. https://doi.org/10.1242/jeb.02525

Rice, A.N., Farina, S.C., Makowski, A.J., Kaatz, I.M., Lobel, P.S., Bemis, W.E., Bass, A.H.,

2022. Evolutionary Patterns in Sound Production across Fishes. Ichthyology & Herpetology 110. https://doi.org/10.1643/i2020172

Richardson, A.J., Matear, R.J., Lenton, A., 2017. Potential impacts on zooplankton of seismic surveys. CSIRO Oceans and Atmosphere, Australia.

Richardson, W.J., Greene Jr, C.R., Malme, C.I., Thomson, D.H., 2013. Marine mammals and noise. Academic Press, San Diego, California.

Roberts, L., Cheesman, S., Breithaupt, T., Elliott, M., 2015. Sensitivity of the mussel Mytilus edulis to substrate-borne vibration in relation to anthropogenically generated noise. Marine Ecology Progress Series 538, 185–195. https://doi.org/10.3354/meps11468

Rogers, P.H., Cox, M., 1988. Underwater Sound as a Biological Stimulus, in: Atema, J., Fay, R.R., Popper, A.N., Tavolga, W.N. (Eds.), Sensory Biology of Aquatic Animals. Springer New York, New York, NY, pp. 131–149. https://doi.org/10.1007/978-1-4612-3714-3_5

Rountree, R.A., Perkins, P.J., Kenney, R.D., Hinga, K.R., 2002. Sounds of western north Atlantic fishes—data rescue. Bioacoustics 12, 242–244. https://doi.org/10.1080/09524622.2002.9753710

Scholik, A.R., Yan, H.Y., 2002. The effects of noise on the auditory sensitivity of the bluegill sunfish, *Lepomis macrochirus*. Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology 133, 43–52. https://doi.org/10.1016/S1095-6433(02)00108-3

Simpson, S., Meekan, M., McCauley, R., Jeffs, A., 2004. Attraction of settlement-stage coral reef fishes to reef noise. Marine Ecology Progress Series 276, 263–268. https://doi.org/10.3354/meps276263

Simpson, S.D., Radford, A.N., Holles, S., Ferarri, M.C.O., Chivers, D.P., McCormick, M.I., Meekan, M.G., 2016. Small-boat noise impacts natural settlement behavior of coral reef fish larvae, in: Popper, A.N., Hawkins, A. (Eds.), The effects of noise on aquatic life II, Advances in Experimental Medicine and Biology. Springer New York, New York, NY, pp. 1041–1048. https://doi.org/10.1007/978-1-4939-2981-8_129

Sisneros, J.A., 2009. Seasonal Plasticity of Auditory Saccular Sensitivity in the Vocal Plainfin Midshipman Fish, *Porichthys notatus*. Journal of Neurophysiology 102, 1121–1131. https://doi.org/10.1152/jn.00236.2009

Smott, S., Monczak, A., Miller, M.E., Montie, E.W., 2018. Boat noise in an estuarine soundscape–A potential risk on the acoustic communication and reproduction of soniferous fish in the May River, South Carolina. Marine Pollution Bulletin 133, 246–260.

Solé, M., Lenoir, M., Durfort, M., Fortuño, J.-M., Van Der Schaar, M., De Vreese, S., André, M., 2021. Seagrass Posidonia is impaired by human-generated noise. Communications Biology 4, 743. https://doi.org/10.1038/s42003-021-02165-3

Solé, M., Sigray, P., Lenoir, M., van der Schaar, M., Lalander, E., André, M., 2017. Offshore

exposure experiments on cuttlefish indicate received sound pressure and particle motion levels associated with acoustic trauma. Scientific Reports 7, 45899.

Spence, J.H., 2007. A Summary of Existing and Future Potential Treatments for Reducing Underwater Sounds from Oil and Gas Industry Activities, in: OCEANS 2007. Presented at the Oceans 2007, IEEE, Vancouver, BC, pp. 1–15. https://doi.org/10.1109/OCEANS.2007.4449420

Staaterman, E., Paris, C.B., Kough, A.S., 2014. First evidence of fish larvae producing sounds. Biology Letters 10, 20140643. https://doi.org/10.1098/rsbl.2014.0643

Staaterman, E., Rice, A.N., Mann, D.A., Paris, C.B., 2013. Soundscapes from a Tropical Eastern Pacific reef and a Caribbean Sea reef. Coral Reefs 32, 553–557. https://doi.org/10.1007/s00338-012-1007-8

Stanley, J.A., Radford, C.A., Jeffs, A.G., 2012. Location, location, location: Finding a suitable home among the noise. Proceedings of the Royal Society B 279, 3622–3631. https://doi.org/10.1098/rspb.2012.0697

Stenberg, C., Støttrup, J.G., van Deurs, M., Berg, C.W., Dinesen, G.E., Mosegaard, H., Grome, T.M., Leonhard, S.B., 2015. Long-term effects of an offshore wind farm in the North Sea on fish communities. Marine Ecology Progress Series 528, 257–265.

Stocker, M., 2002. Fish, mollusks and other sea animals' use of sound, and the impact of anthropogenic noise in the marine acoustic environment. The Journal of the Acoustical Society of America 112, 2431–2431. https://doi.org/10.1121/1.4779979

Tavolga, W.N., 1980. Hearing and sound production in fishes in relation to fisheries management. Presented at the fish behavior and its use in the capture and culture of fishes. ICLARM Conference Proceedings, pp. 102–123.

Tavolga, W.N., 1960. Sound production and underwater communication in fishes. Animal Sounds and Communication 62, 93–136.

Teleki, G.C., Chamberlain, A.J., 1978. Acute Effects of Underwater Construction Blasting on Fishes in Long Point Bay, Lake Erie. Journal of the Fisheries Research Board of Canada 35, 1191–1198. https://doi.org/10.1139/f78-190

Thomsen, F., Gill, A., Kosecka, M., Andersson, M., Andre, M., Degraer, S., Folegot, T., Gabriel, J., Judd, A., Neumann, T., 2015. MaRVEN–Environmental impacts of noise, vibrations and electromagnetic emissions from marine renewable energy. Final study report RTD-KI-NA-27-738-EN-N prepared for the European Commission, Directorate General for Research and Innovation.

Thomsen, F., Lüdemann, K., Kafemann, R., Piper, W., 2006. Effects of offshore wind farm noise on marine mammals and fish. Biola, Hamburg, Germany on behalf of Collaborative Offshore Wind Energy Research into the Environment (COWRIE) Ltd 62, 1–62.

Thomsen, F., Mueller-Blenkle, C., Gill, A., Metcalfe, J., McGregor, P.K., Bendall, V.,

Andersson, M.H., Sigray, P., Wood, D., 2012. Effects of pile driving on the behavior of cod and sole. Presented at the the effects of noise on aquatic life, Springer, pp. 387–388.

Tougaard, J., Hermannsen, L., Madsen, P.T., 2020. How loud is the underwater noise from operating offshore wind turbines? The Journal of the Acoustical Society of America 148, 2885–2893. https://doi.org/10.1121/10.0002453

Tougaard, J., Kyhn, L.A., Amundin, M., Wennerberg, D., Bordin, C., 2012. Behavioral reactions of harbor porpoise to pile-driving noise. Presented at the effects of noise on aquatic life, Springer, pp. 277–280.

Valentine, S.V., 2011. Emerging symbiosis: Renewable energy and energy security. Renewable and Sustainable Energy Reviews 15, 4572–4578.

Van Oosterom, L., Montgomery, J.C., Jeffs, A.G., Radford, C.A., 2016. Evidence for contact calls in fish: Conspecific vocalisations and ambient soundscape influence group cohesion in a nocturnal species. Scientific Reports 6, 19098. https://doi.org/10.1038/srep19098

Vermeij, M.J.A., Marhaver, K.L., Huijbers, C.M., Nagelkerken, I., Simpson, S.D., 2010. Coral Larvae Move toward Reef Sounds. PLoS ONE 5, e10660. https://doi.org/10.1371/journal.pone.0010660

Vester, H.I., Folkow, L.P., Blix, A.S., 2004. Click sounds produced by cod (*Gadus morhua*). The Journal of the Acoustical Society of America 115, 914–919. https://doi.org/10.1121/1.1639106

Ward, R.J., 2015. Measuring the speed of sound in water. Physics Education 50, 727–732. https://doi.org/10.1088/0031-9120/50/6/727

Wenz, G.M., 1962. Acoustic ambient noise in the ocean: spectra and sources. The Journal of the Acoustical Society of America 34, 1936–1956. https://doi.org/10.1121/1.1909155

Wilson, B., Batty, R.S., Dill, L.M., 2004. Pacific and Atlantic herring produce burst pulse sounds. Proceedings of the Royal Society of London B 271, S95–S97.

Wilson, C., Wilson, P., Greene, C., Dunton, K., 2013. Seagrass meadows provide an acoustic refuge for estuarine fish. Marine Ecology Progress Series 472, 117–127. https://doi.org/10.3354/meps10045

Wilson, M., Montie, E.W., Mann, K.A., Mann, D.A., 2009. Ultrasound detection in the Gulf menhaden requires gas-filled bullae and an intact lateral line. Journal of Experimental Biology 212, 3422–3427.

Wright, D.G., Hopky, G.E., 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. Fisheries and Oceans Canada Ottawa.

Wright, K.J., Higgs, D.M., Cato, D.H., Leis, J.M., 2010. Auditory sensitivity in settlement-stage larvae of coral reef fishes. Coral Reefs 29, 235–243. https://doi.org/10.1007/s00338-009-0572-y